CHEMISTRY

JEE (MAIN AND ADVANCED)

CHEMISTRY

PERIODIC TABLE

Problems

1. What is called 'a chemical family'?

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2. What would be the group and period of the element with atomic number 80 ?

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3. How would you justify the presence of 18 elements in the 5th period of the periodic table.

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4. The element Z=117 has not been discovered. In which group would you place these element and also give the electronic configuration.

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5. What would be the IUPAC name and symbol for the element with atomic number 120 ?

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6. Which is the longest group of the long form of the periodic table? How many elements are present in it?

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7. Why there is a break in the thirdperiod elements of the long form of the periodic table?

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8. Elements of group 10 is called pseudo-inert group, Why?

9. Is there any liquid transition element? If so name it?

10. Compare the radii of H atom, H^+ ion and H^- ion.

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11. Which is a bigger ion among Na^+, F^-, O^{2-} and Mg^{2+}? Why?

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12. Zr is in 4d-series, Hf is in 5d-series. But their atomic radii is same. Why?

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13. The successive ionisation enthalpies of an element M are $5.98, 18.82, 28.44, 119.96, 153.77, \ldots\ldots eV$ atom What is the formula of chloride of M?

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14. The ionisation enthalpy of sodium is 5.14 eV. How many k cal of energy is required to ionise all atoms present in one gram of gaseous Na atoms?

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15. Why I_1 of Al is less than that of Mg?

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16. Write the descending order of electron affinity values of chalcogens.

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17. Process (A) : $F_{2(g)} + 2e^- \rightarrow 2F^-\_((g))$

,

Process (B) : $Cl_{2(g)} + 2e^- \rightarrow 2Cl_g^-$

which of these process is easy ? Why ?

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18. Bond energies of H_2, Cl_2 and HCl are respectively $104, 58 \text{ and } 103 \text{ k cal mol}^{-1}$. Calculate Pauling's electronegativity of chlorine.

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19. How is the nature of covalent bond between two atoms predicted ?

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20. The ionisation enthalpy of sulphur is $1014 \mathrm{kJmol}^{-1}$. If its electronegativity is 2.4, what is its electron gain enthalpy?

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21. The electronegativity values according to Mulliken scale are _____ times to those in Pauling scale

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22. What is the valency and oxidation number of nitrogen in nitrogen pentoxide ?

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23. Write the minimum and maximum valencies of elements.

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24. The oxidation state and covalency of AI on $[AICIH_2O_5]^{2+}$ ARE respectively

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25. Using the periodic table , predict the formula of compound formed between element x group 13 and another element Y of group 16 .

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26. How does the electropositivity vary down the group of halogens?

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27. Is hydrogen electropositive?

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28. Predict the metallic nature of the elements with atomic numbers 34, 35, 36 and 37.

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29. In aqueous solutions lithium is best reductiant. Why ?

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30. Considering the elements B,Al, Mg and K, the correct order of their metallic character is

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31. Considering the elements B,C,N,F and Si, the correct order of their non-metalllic character is

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32. Name the elements of the second period (a) which forms a strongly basic oxide and (b) which forms a strongly acidic oxide.

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33. Compar the acidic nature :

(a) H_2O and H_2O_2 and (b) Co and CO_2

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34. Lithium is monovalent . Magnesium is divalent. But Li and Mg are diagonally related pair of elements. Why ?

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35. Considering the elements F, Cl, O and N, the correct order of their chemical reactivity in terms of oxidizing property is

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36. List out the properties of elements which increase in a group from top to bottom as well as in a period from left to right.

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37. Compare the oxidation ability of sulphur and chlorine.

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Subjective Exercise 1 Long Answer Questions

1. Discuss in detail about the classification of elements by Mendeleeff.

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2. From a study of the properties of the neighbouring elements, the properties of an unknown element can be predicted. Justify with an example.

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3. What are the limitations of Mendeleeff's periodic law ? Give any four of them.

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4. Define the mordern periodic law . Discuss the construction of the long form of the periodic table .

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5. Define modern periodic law. How is the long form of the periodic table constructed on the basis of this law?

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6. Discuss the relation between the number of electron filled into the sub energy levels of an orbit and the maximum number of elements present in a period.

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7. Write an essay on the division of elements into s, p, d and f - blocks.

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8. Relate the electronic configurations of elements and their properties in the classification of the elements.

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9. Explain how the elements are classified into s,p,d, and f - block elements in the periodic table and give the advantages of this kind of classification

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Subjective Exercise 1 Short Answer Questions

1. What is the need to classify elements ?

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2. How did Mosley's work on atomic number show that atomic number is a fundamental property better than atomic weight?

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3. Define Modern periodic law? Why many groups and periods are present in the long form of the periodic table?

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4. Why f-block elements are placed below the main table.

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5. Mention the number of elements present in each of the periods in the long form periodic table.

6. Give the general electronic configuration of the four types of elements

7. Write a short notes on representative elements.

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8. Give any five of the characteristic properties of transition elements.

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9. Explain the position of inner transition elements in the periodic table

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Subjective Exercise 1 Very Short Answer Questions

1. What are representative elements? Give their valence shell configuration

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2. Justify the position of f-block elements in the periodic table.

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3. An element 'X' has atomic number 34. Give its position in the periodic table.

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4. Write the anomalous electronic configuration of elements

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5. Write the electronic configuration of chromium. What is its importance?

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6. Write the IUPAC nomenclature of the elements with atomic number greater than 103.

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7. What are representative elements? Why they were called like that?

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8. What are rare earths and transuranic elements?

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9. The catalyst used in Haber's process is

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10. What are Inert gases ? Name them.

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11. What is the magentic moment of Ferrous & Ferric ions

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12. Which element was misplaced in p-block ?

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Subjective Exercise 2 Long Answer Question

1. What is a periodic property? How does the following change in a group and a period? Explain.

a) Atomic radius

b) Eletron gain enthaply

c) Electronegativity

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2. Write a note on the following

a) Crystal radius

b) Van der Waals radius and

c) Covalent radius of elements

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3. Define first and second ionization potentials. greater than the first ionization potential? Discuss three factors affecting IP values of elements

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4. Write the relation between the magnitude of screening effect and the ionization enthalpy

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5. Ionization enthalpy of elements is a periodic property. Explain ?

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Subjective Exercise 2 Short Answer Questions

1. How does the covalent raduis increase in group 7?

2. What are atomic and ionic radii? How do they vary in a period and in a group

3. How does atomic radius vary in a period and in a group? How do you explain the variation.

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4. The atomic radii of transition elements decreases slowly as the atomic number increases in a period. Account for it

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5. Among the groups of transition elements, the ionic radius increases with an increases in atomic number. Justify.

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6. What are transition elemets? Give any two special properties of these elements

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7. Arrange the elements of 2^{nd} period in the increasing order of their 1^{st} ionization energies . What is your observation ?

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8. Which element of 3^{rd} period has the highest $I.E_1$? Explain the variation of $I.E_1$ in this period?

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9. Write short note on electron affinity.

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10. As atomic number increases, atomic size increases in a group and decreases along a period . Give reasons for this behaviour.

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11. What is lanthanoid contraction ? What are the consequences of lanthanoid contraction?

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12. Both ionisation enthalpy and electron gain enthalpy have some irregular trends in the third period. Explain.

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13. What is lanthanoid contraction ? What are the consequences of lanthanoid contraction?

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Subjective Exercise 2 Very Short Answer Questions

1. Mention a few properties that show periodicity

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2. The atomic radius of an inert gas atom appears to be the highest amongst the p-block elements. Why?

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3. Write the relation between the magnitude of screening effect and the ionization enthalpy

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4. What is meant by penetration of orbitals. Write the sequence of the penetrations of the atomic orbitals.

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5. Define cationic radius and anionic radius. How radius changes upon ion formation?

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6. Which is a bigger ion among Na^+, F^-, O^{2-} and Mg^{2+}? Why?

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7. What is shielding effect? How does it effect the ionisation potential values ?

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8. 'B' has a lesser ionisation potential than 'Be'.

Why?

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9. 'N' has higher ionisation potential than 'O'.

Why ?

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10. Why is I_2 of an element greater than its first I_1 ?

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11. Explain the decrease in the trend of the radius: $Fe > Fe^{2+} > Fe^{3+}$

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12. What is electron affinity? Why the electron affinity of fluorine is less than that of chlorine?

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13. I_1 and I_2 of an element are 700 and 1200 kJmol$^-$ If 1000 kJ mol^{-1} energy is supplied to the gaseous atomic element and the ionisations occur in succession, find the ratio of monovalent and divalent cations.

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14. The first ionization energy of Lithium will be

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15. The ionisation enthalpy of sulphur is $1014 \mathrm{kJmol}^{-1}$. If its electronegativity is 2.4, what is its electron gain enthalpy?

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Subjective Exercise 3 Long Answer Questions

1. What is electronegativity?

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2. How do the following properties change in I group and in 3rd period ? Explain with suitable examples.

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3. How does the nature of oxides vary in the third period?

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4. Metallic and non-metallic properties of elements

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Subjective Exercise 3 Short Answer Questions

1. Classify the elements on the basis of their oxides.

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2. Write a note on variation of metallic nature in groups and periods

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3. What is electropositive nature ? Explain its variation in a group and along a period.

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4. What is valency? How is it related to the reference elements?

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5. Inert pair effect is exhibited by

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6. What is diagonal relation? Give one pair of elements, that have this relation.

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7. Why do elements show diagonal relationship ?

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8. How does the acidic or basic nature of oxides change in a period?

9. Mention the most electronegative element in the periodic table. What is the electronegativity value of fluorine ?

Subjective Exercise 3 Very Short Answer Questions

1. How many types of oxides are noticed broadly in the periodic table for classification of elements ? What are they ?

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2. What is electronegativity? How is this useful in understanding the nature of elements?

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3. Write the relation between Pauling's scale and Mulliken's scale of electronegativities.

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4. What is the valency possible to Arsenic with respect to oxygen and hydrogen?

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5. What is an amphoteric oxide? Give the formula of an amphoteric oxide formed by an element of group-13.

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6. Name the most electronegative element. Is it also having the highest electron gain enthalpy? or Why not?

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7. What elements show diagonal relationship?

Give an example

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8. How does the nature change from Na_2O to

CI_2O_7 in the period ?

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9. Define electronegativity of an element on Mulliken scale.

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10. Why is I_2 of an element greater than its first I_1 ?

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11. Bond energies of H_2, F_2 and HF are respectively 104.2, 36.6 and $134.6 kcal \text{mol}^{-1}$. If the electronegativity value of hydrogen is 2.1, calculate the electro-negativity value of fluorine.

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Objective Exercise 1 Introduction

1. The maximum number of elements available in elemental form

A. 26

B. 92

C. 111

D. 118

Answer: B

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2. Which of the following is Dobereiner triad

A. Li, Na, K

B. Fe,Co,Ni

C. Ru, Rh, Pd

D. Os, Ir, Pt

Answer: A

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3. Number of short periods in the long form of periodic table

A. 3

B. 2

C. 4

D. 6

Answer: A

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4. Considering the chemical properties, atomic weight of the element 'Be' was corrected based on

A. Valency

B. Configuration

C. Density

D. Atomic volume

Answer: A

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5. Eka silicon is now known as

A. Scandium

B. Gallium

C. Germanium

D. Boron

Answer: C

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6. The element 'Sc' is known long back as

A. eka-aluminium

B. eka-boron

C. eka-silicon

D. eka-mercury

Answer: B

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7. By taking chemical properties into consideration, the atomic weights of the following elements were corrected

A. Te & I

B. Ar & K

C. Co & Ni

D. Be & In

Answer: D

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8. Anamolous pair among the following are

A. Boron - Silicon

B. Beryllium - Indium

C. Aluminium - Gallium

D. Cobalt - Nickel

Answer: D

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Objective Exercise 1 Long Form Of Periodic Table

1. The longest and shortest periods are

A. 1 & 6

B. 2 & 6

C. 6 & 1

D. 1 & 7

Answer: C

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2. The number ofelements present in 2nd, 3rd, 4th and 5th IJeriods of modern periodic table respectively are

A. 2, 8,8 & 18

B. 8,8,18 & 32

C. 8 , 8 ,1 8 & 1 8

D. 8, 18, 18 & 32

Answer: C

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3. Which of the following pair of elements are from the same group of the periodic table

A. Mg, Cs

B. Mg, Sr

C. Mg,Cl

D. Na,Cl

Answer: B

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4. Elements of a vertical group have

A. Same atomic number

B. Same electronic configuration

C. Same number of valency electrons

D. Same number of core electrons

Answer: C

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5. The general electronic configuration of elements of carbon family

A. $ns^2\ np^4$

B. $ns^2\ np^3$

C. $ns^2\ np^1$

D. $ns^2\ np^2$

Answer: D

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6. Outer shell 'octet' configuration is observed for the elements of the group

A. 2

B. 8

C. 18

D. 32

Answer: C

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7. The starting element of fifth period is

A. K

B. Rb

C. Kr

D. Xe

Answer: B

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8. Element with atomic number 15 and mass number 31 is present in

A. group 5 and period 4

B. group 5 and period 3

C. group 15 and period 3

D. grou'P 15 and period 4

Answer: C

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9. In the periodic table, the elements are arranged in the periods following the

A. Hund's rule of maximum multiplicity

B. Pauli's exclusion principle

C. Aulbau principle

D. Both (1) and (2)

Answer: C

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10. Which of the following pairs of atomic numbers represents elements belonging to the same group?

A. 11,20

B. 12,30

C. 13, 31

D. 14, 33

Answer: C

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11. As per the modern periodic law, the physical and chemical properties of elements are periodic functions of their

A. atomic number

B. electronic configuration

C. atomic weight

D. atomic size

Answer: B

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12. An element with atomic number 20 will be placed in which period of the periodic table?

A. 2

B. 3

C. 2

D. 1

Answer: A

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13. If the atomic number of an element is 33, it will be placed in the periodic table in the

A. First group

B. Third group

C. Fifth group

D. Seventh group

Answer: C

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14. The number of periods present in the long form of the periodic table

A. 6

B. 7

C. 8

D. 18

Answer: B

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15. The electronic configuration of group III elements is

A. $ns^2\ np^3$

B. $ns^2\ np^5$

C. $ns^2\ np^1$

D. $ns^2\ np^2$

Answer: C

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16. The total number of gaseous elements are

A. 8

B. 9

C. 10

D. 11

Answer: D

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17. In a period, elements are arranged in strict sequence of

A. Decreasing charges in thc nucleus

B. Increasing charges in lhe nucleus

C. Conslant charges in the nucleus

D. Equal charges in the nucleus

Answer: B

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Objective Exercise 1 Blocks And Types Of Elements

1. The general electronic configuration of d-block elements is

A. $ns^{1-2}(n-1)d^{1-10}$

B. $ns^2(n-1)d^1(n-2)f^{1-14}$

C. $ns^{1-2}(n-1)d^{1-9}$

D. $ns^{1-2}np^6(n-1)d^{1-10}$

Answer: A

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2. Identify the correctly matched set among the following

A. Scandium - cl - block - represcntative element

B. Lanthanum - d-block-inner transition element

C. Cerium - f· block - transition element

D. Actinium - d - block - transition element

Answer: D

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3. The representative elements get the nearest inert gas configuration

A. By losing electrons

B. By gaining electrons

C. By gaining electrons

D. By losing or gaining or sharing electrons

Answer: D

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4. In transition elements, the shells that are incompletely filled

A. Ultimate shell only

B. Penultimate shell only

C. Both ultimate & penultimate shells

D. Outermost three shells

Answer: C

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5. The characteristic properties of transition elements are due to

A. Unpaired electrons in d-subshell

B. cl-orbitals have five fold degeneracy

C. Presence of 2 nodal planes for cl-orbital

D. Because they belong to d-block

Answer: A

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6. Rare earths are generally

A. Actinides

B. f-block elements

C. Inner transition elements

D. Lanthanides

Answer: D

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7. Lanthanum belongs to

A. s-block

B. p-block

C. d-block

D. f-block

Answer: C

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8. In the periodic table transition elements begin with

A. Scandium

B. Zinc

C. Copper

D. Mercury

Answer: A

9. Inert gas element which has a different valence shell configuration

A. Xe

B. Ne

C. Kr

D. He

Answer: D

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10. Atomic numbers of actinides are

A. 57 to 71

B. 80 to 103

C. 58 to 71

D. 90 to 103

Answer: D

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11. Most of the non-metals are present in the long form of the periodic table in

A. p-block

B. f·block

C. d·block

D. s-block

Answer: A

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12. Metal used as catalyst in the hydrogenation of vegetable oils

A. Iron

B. Molybdenum

C. Nickel

D. Sodium

Answer: C

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13. Tile 4f-subshell is successively filled for

A. Rare earths

B. Rare gases

C. Transition metals

D. Transition metals

Answer: A

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14. The role of 'Molybdenum' in Uaber's synthesis is

A. A positive catalyst

B. A negative catalyst

C. Poison for catalyst

D. Promoter for catalyst

Answer: D

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15. The period in which s-block, p-block and d-block elements are present

A. 1

B. 6

C. 7

D. 3

Answer: B

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16. Elements of p-block are

A. Only non-metals

B. Only metalloids

C. Metalloids and non-metals

D. Metalloids, non-metals and metals

Answer: D

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17. The following ion is colourless in aqueous solution ?

A. Ca^{2+}

B. Sc^{3+}

C. Zn^{2+}

D. all the above

Answer: D

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18. Which of the following electronic configuration corresponds to an inert gas ?

A. $1s^2 2s^2 2p^5$

B. $1s^2 2s^2 2p^6$

C. $1s^2 2s^1$

D. $1s^2 2s^2 2p^6 3s^1$

Answer: B

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19. The rare gas that is most abundant in the atmosphere is

A. He

B. Ne

C. Ar

D. Kr

Answer: C

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20. In lanthanides, the differentiating electron enters into

A. d - subshell

B. f - subshell

C. p - subshell

D. s - subshell

Answer: B

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21. Which is not a transition metal?

A. Ag

B. Pb

C. Cr

D. Pt

Answer: B

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22. The general electronic configuration $(n-1)d^3ns^2$? indicates that the particular element belong to the group

A. VB

B. VA

C. IVB

D. IIB

Answer: A

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23. The configuration of chromium atom in ground state is

A. [Ar] $4d^4 4s^2$

B. [Ar] $4d^5 4s^1$

C. [Ar] $4d^4 3s^2$

D. [Ar] $3d^5 4s^1$

Answer: D

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24. Which one of the following pairs of ions have the same electronic configuration

A. Cr^{+3}, Fe^{+3}

B. Fe^{+3}, Mn^{+2}

C. Fe^{+3}, Co^{+3}

D. Sc^{+3}, Cr^{+3}

Answer: B

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25. The electronic configuration $1s^2 2s^2 2p^6 3s^2$ represents

A. Oxygen

B. Magnesium

C. Calcium

D. Sulphur

Answer: D

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26. What is wrong about transition metals?

A. They are diamagnetic

B. They are paramagnetic

C. They form complexes

D. They show variable oxidation state

Answer: A

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27. Which of the following is a rare earth element?

A. Oxygen

B. Magnesium

C. Calcium

D. Sulphur

Answer: C

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28. Transition element exhibit variable valency on account of ..... d- orbitals .

A. Normal elements

B. Metallic elements

C. Transitional elements

D. Non-metallic elements

Answer: C

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29. Which one of the following is correct about stability of the given ions

A. $Pb^{2+} > Pb^{4+}$

B. $Pb^{4+} > Pb^{2+}$

C. $Si^{2+} > Si^{4+}$

D. $Sn^{4+} > Sn^{2+}$

Answer: A

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30. The transition element among the following is

A. Cu

B. Sn

C. Pb

D. Zn

Answer: A

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Objective Exercise 1 Atomic And Ionic Radius

1. Which of the following is not a periodic property ?

A. Valency

B. Specific heat

C. Ionisation portential

D. Atomic size

Answer: B

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2. Elements of the same vertical group of the periodic table have

A. same atomic size

B. same electronic configuration

C. same number of electrons in outermost shell of their atoms

D. same number of atoms

Answer: C

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3. The approximate size of an atom is

A. 10^{-6}m

B. 10^{-8}m

C. 10^{-10}m

D. 10^{-12}m

Answer: C

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4. Atomic radius is measured by

A. Mulliken oil drop method

B. Rutherford's a-ray scattering experiment

C. X-ray diffraction technique

D. Electric discharge tube experiment

Answer: C

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5. Atomic radius depends upon

(i) Number of bonds formed by the atom

(ii) Nature of the bonding

(iii) Oxidation state of the atom

A. Number of bonds formed by the atom

B. Nature of the bonding

C. Oxidation state of the atom

D. All the above

Answer: D

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6. Covalent bond length of chlorine molecule is 1.98Å. Then covalent radius of chlorine is

A. $198Å$

B. $1.7Å$

C. $2.05Å$

D. $0.99Å$

Answer: D

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7. Van der Waal's radius is used for

A. Molecular substances in gaseous state only

B. Molecular substances in solid state only

C. Molecular substances in liquid state only

D. Molecular substances in any state

Answer: B

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8. If the atomic radius of non-metal bromine is 1.14 Å, its covalent radius is

A. 1.14Å

B. 1.12Å

C. 1.16Å

D. 0.57Å

Answer: A

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9. The covalent and van der Waals radii of chlorine respectively are

A. 1.14Å

B. 1.12Å

C. 1.16Å

D. 0.57Å

Answer: B

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10. In the isoelectronic species the ionic radii (A°) of N^{3-}, O^{2-} and F^{-} are respectively given by

A. $1.36, 1.71, 1.40$

B. $1.36, 1.40. 1.71$

C. $1.71, 1.36, 1.40$

D. $1.71, 1.40, 1.36$

Answer: D

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11. Correct statement among the following is

A. Covalent radius is $40\,\%$ more than Van der waals radius

B. Van der waals radius is· less than covalent radius

C. Van der waal's radius is $40\,\%$ more than covalent radius

D. Radii cannoL be compared

Answer: B

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12. Very slight decrease in atomic radius occurs in a transition series when compared with that in representative series. This is due to

A. Shielding effect

B. Penetrating effect

C. Compton effect

D. Inert pair effect

Answer: A

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13. Separation of Lanthanides from their mixture is not easy because of

A. Shielding effect

B. Penetrating effect

C. Consequences of lanthanide contraction

D. Inert pair effect

Answer: C

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14. If the radius of Fe^{++} is $0.76A^{\circ}$, the radius of Fe^{+++} may be

A. $0.64A^{o}$

B. $0.76A^{o}$

C. $0.88A^{o}$

D. $1.08A^{o}$

Answer: A

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15. Among elements with the following electronic configurations, the one with the largest radius is

A. $1s^2 2s^2 2p^6 3s^2$

B. $1s^2 2s^2 2p^6 3s^2 3p^1$

C. $1s^2 2s^2 2p^6 3s^2 3p^3$

D. $1s^2 2s^2 2p^6 3s^2 3p^5$

Answer: A

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16. Largest ion among the following is

A. Na^+

B. O_2^-

C. S^{2-}

D. Cl^-

Answer: C

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17. Which of the following has the largest atomic radius ?

A. Al

B. Si

C. cl

D. Na

Answer: D

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18. Which of the following order is correct for the size of Fe^{3+}, Fe and Fe^{2+} ?

A. $Fe < Fe^{2+}$

B. $Fe^{2+} < Fe^{3+} < Fe$

C. $Fe < Fe^{3+} < Fe^{2+}$

D. $Fe^{3+} < Fe^{2+} < Fe$

Answer: D

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19. Metallic radius of Ca is 200pm. Covalent radius of Ca is

A. 200 pm

B. 230 pm

C. 280 pm

D. 174 pm

Answer: D

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20. Similarity in the radius of Zr and Hf is explained on the basis of

A. Lanthanide contraction

B. Inert pair effect

C. Same outershell configuration

D. Anomalous configuration

Answer: A

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21. Which one is the correct order of the size of the iodine species?

A. $I > I^+ > I^-$

B. $I > I^- I^+$

C. $I^+ > I^- > I$

D. $I^- > I > I^-$

Answer: D

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22. Identify the correct order of innic radii of the following ions

A. $Na^+ > Mg^{2+} > At^{3+} > O^{2-} > F^-$

B. $Na^+ > F^- > Mg^{2+} > O^{2-} > Al^{3+}$

C. $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$

D. $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$

Answer: C

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23. The Lanthanide contraction relates to (AFMC)

A. Oxidaion states

B. Magnetic state

C. Atomic radii

D. Valence electrons Ionisation Potential

Answer: C

Watch Video Solution

Objective Exercise 1 Ionisation Potential

1. Which of the following process refers to ionisation potential ?

A. $X_{(s)} \rightarrow X^{+}_{(g)} + e^{-}$

B. $X_{(g)} + aq \rightarrow X^{+}_{(aq)} + e^{-}$

C. $X_{(g)} \rightarrow X^{+}_{(g)} + e^{-}$

D. $X_{(g)} + e^{-} \rightarrow X^{-}_{(g)}$

Answer: C

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2. When the screening effect increases, ionisation energy

A. Decreases

B. Increases

C. First increases and then decreases

D. Remains constant

Answer: A

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3. With an increase in the extent of penetration of valence electrons, ionisation energy

A. Decreases

B. Increases

C. Remains constant

D. Both are not related

Answer: B

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4. The group of elements with highest second ionisation energy is

A. IIA group

B. Zero group

C. VIIA group

D. IA group

Answer: D

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5. How many ionisation energies can carbon have ? Electron configuration of carbon

$$\text{in Ground state} \quad 1s^2 2s^2 2p_x^1 2p_y^1$$

$$\text{in Excited state} \quad 1s^2 2s^1 2p_x^1 2p_y^1 2p_z^1$$

A. 1

B. 2

C. 4

D. 6

Answer: D

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6. Why first ionisation potential of aluminium is less than that of magnesium?

A. Aluminium atom is very large when compared to Mg

B. Aluminium has a stable electronic configuration

C. Magnesium has a stable electronic configuration

D. The electron affinity of Magnesium is positive (energy is absorbed)

Answer: C

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7. Electrons with the highest penetrating power are

A. p-electrons

B. s-electrons

C. d-electrons

D. f-electrons

Answer: B

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8. The elements that possess the lowest ionisation energy among the following

A. Oxygen

B. Fluorine

C. Sulphur

D. Nitrogen

Answer: C

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9. Atoms of the following group possess the highest ionisaiton energies

A. IA

B. IIA

C. VA

D. Zero

Answer: D

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10. Atoms of the following group possess the lowest ionisation energies

A. IA

B. IIA

C. VA

D. Zero

Answer: A

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11. Configuration of the element with the highest ionisation energy is

A. $[Ne]3s^1$

B. $[Ne]3s^23p^3$

C. $[Ne]3d^{10}4s^24p^3$

D. $[Ne]3s^23p^4$

Answer: B

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12. When Lithium vapour is taken in a discharge tube and the potential difference between the electrodes is 5.4 ev, there is a sudden increase in the flow of current. The ionisation energy of Lithium is

A. 54 ev

B. 520 kJ mol^{-1}

C. 54 kJ $a \rightarrow m^{-1}$

D. 5.4 cv $a \rightarrow m^{-1}$

Answer: D

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13. Which of the following transition involves maximum amount of energy?

A. $M^{-}_{(g)} \rightarrow M_{(g)}$

B. $M_{(g)} \rightarrow M^{+}_{(g)}$

C. $M_{(g)}^{+} \rightarrow M_{(g)}^{2+}$

D. $M_{(g)}^{2+} \rightarrow M_{(g)}^{3+}$

Answer: D

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14. The first ionisation potential is maximum for

A. Lithium

B. Uranium

C. Iron

D. Hydrogen

Answer: D

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15. The lowest first ionization energy would be associated with which of the following configurations.

A. $1s^2 2s^2 2p^6 3s^1$

B. $1s^2 2s^2 2p^5$

C. $1s^2 2s^2 2p^6$

D. $1s^2 2s^2 2p^6 3s^2 3p^2$

Answer: A

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16. The maximum tendency to form unipositive ion is for the element with the electronic configuration

A. $1s^2 2s^2 2p^6 3s^2$

B. $1s^2 2s^2 2p^6 3s^2 3p^1$

C. $1s^2 2s^2 2p^6 3s^2 3p^2$

D. $1s^2 2s^2 2p^6 3s^2 3p^3$

Answer: B

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17. As one moves along a given row in the periodic table, ionisation energy

A. Remains same

B. Increasing from left to righl

C. First increases and then decreases

D. deei'eascs from left la right

Answer: B

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18. First four ionisation energy values of an element are 191, 578, 872 and 5972 K.Cals The number of valence electrons in the element is

A. 4

B. 3

C. 1

D. 2

Answer: B

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19. Ionisation potential values of Li, Be and B are respectively in kJ mol^{-1}

A. $80, 899, 520$

B. $520, 801, 899$

C. $899, 801, 520$

D. `520,899,801

Answer: D

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20. Screening effect is not common for the elements of the period

A. 7

B. 3

C. 1

D. 4

Answer: C

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Objective Exercise 1 Electron Affinity

1. Electron affinity is

A. Energy required to take out an electron from an isolated gaseous atom

B. The tendency of an atom to attract an electron towards itself

C. Energy absorbed when an electron is a~o an isolated atom in gaseous state

D. Energy released when an electron is added to nn isolated atom in the

gaseous state

Answer: D

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2. The property of an element that is not normals determined directly but is obtained indirectly using Born-Haber cycle

A. Ionisation potential

B. Electronic affinity

C. Electronegativity

D. Electropositive character

Answer: B

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3. Electron affinity is measured in

A. No units

B. kcal mol^{-1}

C. kj mol^{-1}

D. Both (2) and (3)

Answer: D

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4. Which of the following is an endothermic process?

A. First elctron affinity of clorine

B. Second electron affinity of oxygen

C. Formation of NaCl from gaseous ions

D. Hydrogen of $MgCl_2$

Answer: B

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5. In a period from left to right, electron affinity

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: A

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6. Configuration that shows the highest energy released when an electron is added to the atom

A. $1s^2 2s^2 2p^3$

B. $1s^2 2s^2 2p^4$

C. $1s^2 2s^2 2p^5$

D. $1s^2 2s^2 2p^6$

Answer: C

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7. Electron affinity of Fluorine is less than that of Chlorine because

A. Electroneagtivity of Fluorine is more

B. 2p sub shell of F is smaller

C. Chlorine is a stronger oxidant

D. Bond dissociation energy off F_2 is less

Answer: B

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8. Among chalcogens electron affinity is highest for

A. O

B. S

C. Se

D. Te

Answer: B

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9. The element with highest electron affinity is

A. Fluorine

B. Cesium

C. Helium

D. Chlorine

Answer: D

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10. Incorrect statement is

A. Fluorine has the highest electron affinity

B. Grather the nuclear charrge, greater is the electron affinity

C. The electron affintiy of Nitrogen is positive (energy is absorbed)

D. Chlorine has highest electron affinity

Answer: A

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Objective Exercise 1 Electronegativity

1. The electron affinity values of elements A,B, C and D are respectively -135, -60, -200 and -348

kJ mol^(-1)`. The outer electronic configuration of elecment B is

A. $3s^2 3p^5$

B. $3s^2 3p^4$

C. $3s^2 3p^3$

D. $3s^2 3p^2$

Answer: C

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2. Pauling's electronegativity is based on

A. Electron affinity

B. Ionisation potential

C. Both IP and EA

D. Bond energies

Answer: D

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3. Pauling's electronegativity values for elements are useful in predicting

A. Polarity of the molecules

B. Posittion is the E.M.F series

C. Cooridination numbers

D. Dipole moments

Answer: A

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4. Electronegativity of an element is the average of its ionisation energy and electron affinity according to

A. Pauling

B. Rutherford

C. Bohr

D. Muliken

Answer: D

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5. Correct relation among X_A, X_B, and Δ, where X_A, and X_B are the electronegativities of elements A and B.

A. $X_A + X_B = 0.208\sqrt{\Delta}$

B. $\sqrt{X_A - X_B} = 0.208x\Delta$

C. $X_A - X_B = 0.208\sqrt{\Delta}$

D. $X_A - X_B = \sqrt{0.208x\Delta}$

Answer: C

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6. Reference element for Pauling's electronegativity is

A. H

B. C

C. Cl

D. He

Answer: A

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7. The electronegativity values according to Mulliken scale are _____ times to those in Pauling scale

A. 0.208

B. 2

C. 2.8

D. 544

Answer: C

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8. Electronegativity on Mulliken scale is limited to

A. Monovalent atoms

B. Bivalent atoms

C. both monovalent and bivalent atoms

D. All multivalent atoms

Answer: A

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9. If I and E are ionisation energy and electron affinity of an element in kJ mole^{-1} electronegativity is given as

A. $\frac{I+E}{2}$

B. $\frac{I+E}{5.6}$

C. $\frac{I+E}{129}$

D. $\frac{I+E}{544}$

Answer: D

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10. In a period electronegativity is highest for

A. Chalcogen

B. Halogen

C. Inert gas

D. Alkali metal

Answer: B

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11. The values that are useful in writing chemical formulae and in calculation of oxidation states are

A. Ionisation potential

B. Electron affinity

C. Electronegativity

D. Metallic character

Answer: C

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12. Elements with high electronegativity are generally

A. Good reductants

B. Hard solids

C. Good oxidants

D. Soft solids

Answer: C

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Objective Exercise 1 Valency And Oxidation States

1. The stable oxidation state of Thallium, a IIIA group element is

A. $+1$

B. $+3$

C. -3

D. $+5$

Answer: A

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2. Maximum oxidation state (+8) is exhibited by

A. Co & Ni

B. Ru & Os

C. Cl & I

D. Te & I

Answer: B

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3. An element has nine positive charges in its nucleus. Its common oxidation state is

A. $+7$

B. $+5$

C. -1

D. $+1$

Answer: C

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4. An element with electronic arrangement as 2, 8, 18, 1 will exhibit the following stable oxidation states

A. $+2\& +4$

B. $+1\& +2$

C. $+2$ only

D. $+1 only$

Answer: B

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Objective Exercise 1 Metallic Nature Nature Of Oxides

1. Basic nature of the oxides of a period from left to right

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: B

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2. Oxide that is most acidic

A. Cl_2O_7

B. SO_3

C. P_4C_{10}

D. N_2O_3

Answer: A

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3. Generally the nature of the non-metal oxides is

A. Basic

B. Acidic

C. Amphoteric

D. Neutral

Answer: B

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4. The outermost electronic configuration of most electropositive element is

A. ns^s

B. ns^2np^2

C. $ns^2\ np^3$

D. ns^2np^5

Answer: A

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5. The most electropositive element is

A. I

B. Mg

C. Cs

D. Li

Answer: C

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6. The tendency of an element to lose an electron is called

A. Electronegativity in Mulliken scale is 2.8 times grater than Pauling scale values.

So the value of Electronegativity $= 2.8 \times 4 = 11.2$

B. None metallic charcter

C. Electropositive character

D. Electron affinity

Answer: C

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7. Nature of Sb_4O_6 is

A. Acidic

B. Neutral

C. Basic

D. Amphoteric

Answer: D

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Objective Exercise 1 Diagonal Relationship

1. Chemical similarity between B and Al is due to

A. Diagonal relationship

B. both belong to same period

C. Similar outer electronic configuration

D. Inert pair effect

Answer: C

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2. Pair of ions with similar ionic radii

A. Li^+, Mg^{2+}

B. $Li^+, Na(+)$

C. Mg^{2+}, Ca^{2+}

D. Mg^{2+}, K^+

Answer: A

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3. Among the following pairs of elements, the pair that is different from others is

A. Lithium and magnesium

B. Nitrogen and Phosphorus

C. Beryllium and Aluminium

D. Boron and Silicon

Answer: B

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Objective Exercise 2 A Mendeleeff S Periodic Table

1. The triad not present in Group VIII of Mendeleeff's table

A. Li, Na, K

B. Fe, Co, Ni

C. Ru, Rh, Pd

D. Os, Ir, Pt

Answer: A

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2. In the periodic table, inversion of atomic weights took place in this pair

A. Argon - Potassium

B. Boron - Scandium

C. Hydrogen - Helium

D. Beryllium - Boron

Answer: A

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3. The period that contains only gaseous elements is

A. 1

B. 2

C. 3

D. 4

Answer: A

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4. The element which belong to 3rd period and IVA group of periodic table is

A. Silicon

B. Carbon

C. Germanium

D. Tin

Answer: B

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5. Assertion: According to Mendeleeff, periodic properties of elements is a function of their atomic masses.

Reason : Atomic number is equal to number of protons

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: B

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6. Pair of elements with the following atomic numbers have the same chemical properties

A. 13 & 22

B. 3 % 11

C. 4 & 24

D. 2 & 1

Answer: C

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7. The sub-shells filled one by one for 4th period elements are

A. 3d, 4s and 4p

B. 45, 4p and 4d

C. 4s, 3d and 4p

D. 3d, 4p and 4s

Answer: C

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8. The starting element and last element in the largest period in modern periodic table are

A. Rb and Xe

B. Cs and I

C. Cs and Rn

D. Fr and Kr

Answer: C

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9. Which of the following has both members from the same period of the periodic table

A. Na, F

B. Mg, Ca

C. Na, Cl

D. Be, Al

Answer: C

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10. Atomic number of nitrogen is 7. The atomic number of the third member in the same family is

A. 23

B. 15

C. 33

D. 51

Answer: C

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11. Element with atomic number 38, belongs to

A. II A group and 5th period

B. II A group and 2nd period

C. V A group and 2nd period

D. III A group and 5th period

Answer: A

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12. Set of elements with the following atomic numbers belong to the same group

A. 9, 16, 35, 3

B. 12, 20, 4, 38

C. 11, 19, 27, 5

D. 24, 47, 42, 55

Answer: B

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13. Which of the following pairs has both members from the same group of the periodic table?

A. Mg-Ba

B. Mg-Na

C. Mg-Cu

D. Mg-Cl

Answer: A

14. The elements with atomic number 10, 18, 36, 54 and 86 are all

A. Light metals

B. Inert gases

C. Halogens

D. Rare earths

Answer: B

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15. Which of the following pairs has elements containing same number of electrons in the outermost orbit?

A. N,O

B. Na,Cf

C. Ca,Cl

D. Cl,Br

Answer: D

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16. The period that includes all blocks of elements is

A. 1

B. 2

C. 6

D. 7

Answer: C

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17. Among s-block metals and transition metals, which are more metallic?

A. s-block metals

B. Transition metals

C. Both are equally metallic

D. Cannot be predicted

Answer: A

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18. Element with atomic number 52 belongs to

A. s-block

B. p-block

C. d-block

D. f-block

Answer: B

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19. The general electronic configuration of f-block elements is

A. $ns^2np^6(n-1)d^{0-1}(n-2)f^{1-14}$

B. $ns^2(n-1)d^{0-1}nf^{1-14}$

C. $ns^2nd^{0.1}nf^{1-14}$

D. $ns^2(n-1)d^{0,1}(n-1)f^{1-14}$

Answer: B

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20. The common oxidation state exhibited by inner transition elements usually in their compounds is

A. $+2$

B. $+3$

C. $+5$

D. Zero

Answer: B

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21. The pair of atomic numbers which represent the p-block elements

A. 6,12

B. 7,53

C. 19,35

D. 38,51

Answer: B

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22. Which of the following is an element present in the d-block, but not a transition element?

A. Cd

B. Cu

C. Ca

D. Cr

Answer: A

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23. Which of the following is an alloy of non-transition elements?

A. Elektron

B. Brass

C. Bronze

D. German silver

Answer: A

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24. Common oxidation state of elemental transition metal is

A. $+1$

B. 0

C. $+3$

D. $+2$

Answer: B

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25. Configuration that does not denote a transition element

A. $3d^1 4s^2$

B. $3d^{10} 4s^1$

C. $3d^{10} 4s^2 4p^2$

D. $3d^8 4s^2$

Answer: C

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26. An element of 5f-series but has no electrons filled in 5f-sub shell

A. Ac

B. Ce

C. Th

D. U

Answer: C

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27. An element has 18 electrons in the outer most shell. The element is

A. Transition metal

B. Rare earth metal

C. Alkaline earth metal

D. Alkali metal

Answer: A

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28. Element with electronic arrangement $[Ar]3d^{24}s^2$ belongs to

A. s-block

B. p- block

C. d - block

D. f - block

Answer: C

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29. (A): The ransition metal ions are generally paramagnetic in nature

(R): Metal ions with incompletely filled d-

orbitals are paramagnetic in nature. The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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30. Number of outer shells partially filled for representative elements

A. Zero

B. One

C. Two

D. Three

Answer: B

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31. The atomic number of the element which is not included in the main body of the period table

A. 43

B. 57

C. 68

D. 80

Answer: C

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32. Zinc is not considered as a transition metal because

A. It is diamagnetic

B. It is not known to from alloys

C. It has no unpaired electrons

D. It has white shade

Answer: C

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33. The electronic configuration of an element 'X', is $1s^2 2s^2 2p^6 3s^2 3p^3$? What is the atomic number of the element which is just below 'Xin the periodic table

A. 33

B. 34

C. 31

D. 49

Answer: A

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Objective Exercise 2 A Atomic Radius

1. Atomic radius 34. Atomic radii of fluorine and neon in angstrom units are respectively

A. 0.72,1.62

B. 0.72.0.72

C. 1.2 1.2

D. 1.62,0.72

Answer: A

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2. Which of the following will have largest size?

A. Br

B. I^-

C. I

D. F

Answer: B

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3. The size of the following species increases in the order

A. $Mg^{2+} < Na^{+} < F^{-} < Al^{3+}$

B. $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$

C. $Na^{+} < F^{-} < Al^{3+} < Mg^{2+}$

D. $Na^{+} < Al^{3+} < Mg^{2+} < F^{-}$

Answer: B

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4. In a period of representative elements, the decrease in ionic radius when compared with the corresponding decrease in atomic radius

A. is equal

B. is less

C. is more

D. Cannot be predicted

Answer: C

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5. In which of the following sets, elements have nearly same atomic radii?

A. Li, Be, B

B. Mg, Ca, Sr

C. Fe, Co, Ni

D. O, S, Se

Answer: C

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6. Correct order of atomic radii

A. $N < C < P < S$

B. $C < N < S < P$

C. $C < N < P < S$

D. $N < C < S < P$

Answer: D

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7. If an element 'X' is assumed to have the types of radii, then their order is

A. Crystal radius gt Van der Waals radius gt Covalent radius

B. Van der Waals radius gt Crystal radius gt Covalent radius

C. Covalent radius gt Crystal radius gt Van der waals radius

D. Van der Waals radius gt Covalent radius

gt Carystal radius

Answer: B

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8. Which of the following has smallest radius?

A. Be^{2+}

B. Li^{+}

C. O^{-2}

D. F^-

Answer: B

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9. The elements in which of the following have most nearly the same atomic radius

A. Mg,Ca,Sr,Ba

B. Ca,Ge,As,Ge

C. B,C,N,O

D. Cr,Mn,Fe,Co

Answer: A

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Objective Exercise 2 A Ionisation Potential

1. If the Ionisation potential (I.P.) of Na is 5.48 eV. The I.P. of K will be

A. 4.34 eV

B. 5,68 eV

C. 10.88 eV

D. 5.48 eV

Answer: D

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2. A sudden jump between the values of second and third ionisation energies of an element is associated with configuration

A. $1s^2 2s^2 2p^6 3s^1$

B. $1s^2 2s^2 2p^6 3s^2 3p^1$

C. $1s^2 2s^2 2p^6 3s^2 3p^2$

D. $1s^2 2s^2 2p^6 3s^2$

Answer: A

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3. Amongst the following elements (whose electronic configurations are given below), the

one having the highest first ionization energy is

A. $[Ne]3s^2 3p^1$

B. $[Ne]3s^2 3^3$

C. $[Ne]3s^2 3p^2$

D. $[Ar]3s^{10} 4s^2 4p^2$

Answer: D

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4. The first ionization energy of Lithium will be

A. Greater than Be

B. Less than Be

C. Equal to that of Na

D. Equal to that of F

Answer: B

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5. A sudden jump between the values of second and third ionisation energies of an element is associated with configuration

A. $1s^2 2s^2, 2p^6, 3s^2, 3p^2$

B. $1a^2, 2s^2, 2p^6, 3s^2$

C. $1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

D. $1s^2, 2s^2, 2p^6, 3s^1$

Answer: B

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6. Generally the ionisation potential in a period increases, but there are some exceptions. The one which is not an exception is

A. Be & B

B. N & O

C. Mg & Al

D. Na & Mg

Answer: D

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7. Element that has the highest first ionisation energy among the following is

A. Ca

B. Mg

C. Al

D. Si

Answer: D

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8. The ionization potential of nitrogen is more than that of oxygen because of

A. the greater attraction of the electrons by the nucleus

B. the extra stability of the half filled p-orbitals

C. the smaller size of nitrogen

D. more penetration effect

Answer: B

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9. Which of the following element has the greatest tendency to lose electrons ?

A. F

B. S

C. Fe

D. Be

Answer: C

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10. Second ionisation potential of oxygen is

A. Equal to that of fluorine

B. Less than that of fluorine

C. Greater than that of fluorine

D. Half of that of fluorine

Answer: C

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11. Among the elements A, B, C and D having atomic numbers 9, 10, 11 and 12 respectively the correct order of ionisation energies is

A. $A > B > C > D$

B. $B > A > D > C$

C. $B > A > C > D$

D. $D > C > B > A$

Answer: B

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Objective Exercise 2 A Electron Affinity

1. In which of the following process maximum energy is released

A. $O_{(g)} + e^- \rightarrow O^-_{(g)}$

B. $O^-_{(g)} + e^- \rightarrow O^{-2}_{(g)}$

C. $S_{(g)} + e^- \rightarrow S^-_{(g)}$

D. $S^-_{(g)} + E \rightarrow S^{-2}_{(g)}$

Answer: C

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2. Ionisation energy of F^- is equal in magnitude with the electron affinity of

A. F^-

B. F

C. F^+

D. F^{2+}

Answer: B

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3. When an electron is added, energy is absorbed in which of the following?

A. C

B. N

C. F

D. O

Answer: B

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4. The correct order of electron affinity of the elements of oxygen family in the periodic table is

A. $O > S > Se$

B. $S > O > Se$

C. $S > Se > O$

D. $Se > O > S$

Answer: C

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5. The incorrect order of second ionization energies in the following is

A. $Rb > K$

B. $Na > Mg$

C. $Cr > Mn$

D. $S > P$

Answer: A

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6. Energy is released in the process of

A. $Na_{(g)} \rightarrow Na^{+}_{(g)} + e$

B. $O^{-}_{(g)} + e \rightarrow O^{-2}_{(g)}$

C. $N^{-2}_{(g)} + e \rightarrow N^{-3}_{(g)}$

D. $O_{(g)} + e \rightarrow O^{-}_{(g)}$

Answer: D

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7. Which of the following is the correct order of electron affinity

A. $I > Br > F > Cl$

B. $F < Cl < Br < I$

C. $F > Cl > Br > I$

D. $I < Br < F < Cl$

Answer: D

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Objective Exercise 2 A Electronegativity

1. Pair of elements with equal values of electronegativiy

A. Be, Al

B. Mg,Al

C. Mg,Ca

D. F,Ne

Answer: A

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2. The electronegativity of the following elements increase in the order

A. C,N,Si,P

B. N,Si,C,P

C. Si,P,C,N

D. P,Si,N,C

Answer: C

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3. Two elements A and B have the following electronic configurations. The formula of the compound formed between them can be $A = 1s^2 2s^2 2p^6 3s^2 3p^1, B = 1s^2 2s^2 2p^4$

A. AB

B. AB_2

C. A_2B_3

D. A_3B_2

Answer: C

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4. The formula of a metallic carbonate is MCO_3. The formula of that metallic perchlorate is

A. $MClO_4$

B. M_2ClO_4

C. M_3ClO_2

D. $M(ClO_4)_2$

Answer: D

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5. A metal forms a chloride with the formula MCl_2. Formula of Phosphoric acid is H_3PO_4. Formula of the Phosphate of the metal is

A. M_3PO_4

B. MPO_4

C. $M_3(PO_4)_2$

D. M_2PO_4

Answer: C

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Objective Exercise 2 A Metallic Nature Nature Of Oxides

1. An oxide of an element is a gas and dissolves in water to give an acidic solution. The element belongs to

A. II group

B. IV group

C. VIII group

D. Zero group

Answer: B

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2. Acidic nature of the similar oxides of a group from top to bottom

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: B

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3. Which of the following properties increases across a period ?

A. Reducing property

B. Size of atom

C. Acidic nature of oxides

D. Metallic property

Answer: C

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4. Among the following elements most acidic oxide is given by

A. Al

B. P

C. N

D. Sb

Answer: C

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5. The strongest reducing agent is

A. K

B. Al

C. Mg

D. Br

Answer: A

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6. The more basic oxide is

A. CaO

B. MgO

C. K_2O

D. Na_2O

Answer: C

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7. An element with $1s^2 2s^2 2p^6 3s^2$ electronic arrangement will be forming

A. Acidic oxide

B. Basic oxide

C. Neutral oxide

D. Amphoteric oxide

Answer: B

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Objective Exercise 2 A Diagonal Relationship

1. Diagonal relationship is present between the lighter elements of periods

A. Second, third

B. Second, fourth

C. Third, fourth

D. Third, fifth

Answer: A

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2. The diagonal relationship phenomenon is not observed after

A. I A Group

B. II A Group

C. III A Group

D. IV A Group

Answer: D

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3. The polarising power of which of the following pair is similar

A. Li, Mg

B. Li^+, Mg^{2+}

C. Li^{2+}, Mg^{2+}

D. Li^+, Mg^+

Answer: B

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4. Assertion: Be and Al have similar properties.

Reason : Cations of Be and Al have same polarising power

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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5. Which of the following oxide is amphoteric?

A. CrO

B. Cr_2O_3

C. CrO_3

D. CrO_3

Answer: B

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6. Assertion: Li generally forms covalent compounds

Reason : Li^+ ion is small and has high polarizing power

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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7. Assertion: As_2O_3 and Sb_2O_3 are amphoteric in nature

Reason : As and Sb are metalliods

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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8. Assertion: Lithium resembles magnesium in its properties

Reason: The ratio of ionic charge to $(\text{Ionic radius})^2$ is almost same for Li^+ and Mg^{2+}

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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Objective Exercise 2 B

1. Atomic weight of Eka Al predicted by Mendeleef's is' X' and its experimental value is 'Y' then correct order is

A. $X > Y$

B. $X < Y$

C. $X = Y$

D. $X = \frac{Y}{2}$

Answer: B

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2. The period in which only single block elements are present by definition

A. 6

B. 2

C. 3

D. 1

Answer: D

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3. Among the following, the period that contains solid, liquid and gaseous elements is

A. Fifth period

B. Second period

C. Fourth period

D. Third period

Answer: C

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4. Among a) $Na_2O_2, b) MgO, c) Al_2O_3 : d) P_2O_5$ and $e) Cl_2O_7$ the most basic, most acidic and amphoteric oxide can be

A. a,b,c

B. b,e,c

C. a,e,c

D. e,c,a

Answer: C

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5. The following are some statements about Mendeleeff's periodic table

i) It is based on increasing order of atomic numbers

ii) Mendeleeff corrected the atomic weight of some elements like Be, In etc

iii) (Ar,K), (Co,Ni), (Te,I) are three inverted pairs

A. All are correct

B. ii & iii are correct

C. iii is correct

D. i & iii are correct

Answer: B

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6. The following are some statements about modern periodic table

i) It is based on electronic configuration

ii) It contains 7 periods and 18 groups

iii) Each period begins with a non - metallic element

A. All are correct

B. only i and ii are correct

C. only i is correct

D. only ii and iii are correct

Answer: B

7. Following are some statements about modern periodic table

i) It consists of s, p, d and f blocks

ii) The energy levels filling order in 6th period is 6s, 4f, 5d and 6p

iii) IIIA group contains maximum number of elements

A. only i & ii are correct

B. only i is correct

C. only ii & iii are correct

D. all are correct

Answer: A

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8. Exhibition of various oxidation states by transition elements is due to

A. Less energy difference between ns and (n-1)d sub-shells

B. Small atomic size of transition elements

C. High nuclear charge of transition elements

D. Because they are d-block elements

Answer: A

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9. X' is most inert element and 'Y' is most reactive element in the long form of the periodic table. 'X' and 'Y' are respectively

A. H, F.

B. He, F

C. He, Cs

D. Xe,F

Answer: B

10. In the presence of six ligand units the degeneracy of d-orbitals is lost and split into

two sets. The pair of orbitals present in a single set are

A. d_{xy} and $d_{x^2-y^2}$

B. d_{xy} and d_{z^2}

C. d_{z^2} and $d_{x^2-y^2}$

D. d_{yz} and d_{z^2}

Answer: C

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11. Which of the following is true

A. All transition elements are metallic, but more electropostive than alkaline earths

B. All actinides are synthetic and radioactive

C. All s-block and all p-block elements are representative elements

D. All d-block and all f-block elements are metals

Answer: D

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12. Match the following

LIST - 1	LIST - 2
A) s - block	1) rare earths
B) d - block	2) Noble gases
C) f - block	3) strong reducing agents
D) p - block	4) $(n-1)\ s^2p^6d^{10}$
	5) complex compounds

The correct match is

	A	B	C	D		A	B	C	D
1)	2	1	4	3	2)	5	3	1	2
3)	3	5	1	2	4)	1	5	2	3

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13. Match the following

LIST - 1	LIST - 2
A) Pd	1) $3d^8$
B) Cu^+	2) $3d^5$
C) Ni^{+2}	3) $4d^{10}$
D) Cr	4) $3d^{10}$
	5) $3d^9$

	A	B	C	D		A	B	C	D	
1)	3	4	2	1	2)	2	1	3	5	
3)	3	4	1	2	4)	1	3	4	5	

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14. Match the following

LIST - 1

A) Aerogens

B) Representative elements

C) Transition elements

D) Inner transitionelements

LIST - 2

1) form bonds by gaining or losing or sharing of electrons

2) all are liquids

3) common oxidation state of + 3

4) stable configuration

5) General configuration $ns^{1-2}\ (n-1)d^{1-10}$

The correct match is

	A	B	C	D		A	B	C	D
1)	2	1	4	3	2)	4	1	5	3
3)	3	2	1	4	4)	5	2	1	3

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15. Match the following

LIST - 1	LIST - 2
A) Second period	1) s,f,d
B) Fourth period	2) s,f,d,p
C) Sixth period	3) s,p
D) Seventh period	4) s
	5) s,d,p

The correct match is

	A	B	C	D		A	B	C	D
1)	4	1	3	5	2)	2	3	4	5
3)	3	5	2	1	4)	1	2	4	3

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16. The following are some statements about noble gases

i) They are between halogens and IA group

ii) Except Rn all the remaining are present in the air

iii) These elements belong to 17th group in IUPAC system

A. only i & ii are correct

B. only i is correct

C. only ii & iii are correct

D. all are correct

Answer: A

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17. The following are some statements about transition elements

i) IIB group belong to transition elements

ii) In these elements last two shells ns and (n-1)d are partially filled

iii) They show variable valencies

A. all are correct

B. only iii is correct

C. ii, iii are correct

D. only i & ii are correct

Answer: C

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18. (A): Zn is not a transition element.

(R) : Elements with incompletely filled d-orbital are called transition elements

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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19. The atomic number of an element is 35. what is the total number of electrons present in all the p-orbitals of the ground state atom of that element ?

A. 6

B. 11

C. 17

D. 23

Answer: C

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20. Regarding lanthanide contraction, some statements are given

a) It arises because of the poor shielding

effect of 5f-electrons

b) The atomic radii and ionic radii steadily decrease from Ce to Lu

c) The crystal structures and other properties are similar

d) The seperation of lanthanides from one another is difficult from their salt solutions.

The correct statements are

A. a,b,c

B. b,c,d

C. a,c,d

D. a,b,d

Answer: B

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21. I_1 of an element X is 899 kJ mole^{-1} and that of another element Y is 801kJ mole-1. Then X and Y may be

A. Li,Be

B. Be,B

C. B,C

D. C,N

Answer: B

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22. Consider the following changes

a) $M_{(g)}^{+2} \rightarrow M_{(g)}^{+3} + e^-$

b) $M_{(g)}^{+} \rightarrow M_{(g)}^{+2} + e^-$

d) $M_g \rightarrow M_{(g)}^{+3} + 3e^-$

In Which case more energy is required

A. a

B. b

C. c

D. d

Answer: D

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23. The correct order of IP_2 , values among F, Na, Mg and Al is

A. $Mg > Al > F > Na$

B. $Mg < Al < F < Na$

C. $Al < Mg < F < Na$

D. $M > Al > F < Na$

Answer: B

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24. The first (IP_1) and the second (IP_2) ionisation potential (kJ mol 1) of a few elements designed by roman numerals are

shown below

Element	IP_1	IP_2
I	2372	5251
II	520	7300
III	900	1760
IV	1680	3380

Identify the element which are likely to be a noble gas and a reactive metal respectively

A. I and II

B. II and III

C. I and IV

D. II and IV

Answer: A

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25. The ionisation energies of Lithium and Sodium are $520kJMol^{-1}$ and $495kJMol^{-1}$ respectively. The energy required to convert all the atoms present in 7mg of Li vapour and 23 mg of sodium vapour to their respective gaseous cations respectively are

A. 52 J , 49.5 J

B. 520 j, 495j

C. 49.5 j , 52 j

D. 495 j , 520 j

Answer: B

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26. Successive ionisation potentials of an element M are 8.3, 25.1, 37.9, 259.3 and 340.1ev. The formula of its bromide is

A. MBr_5

B. MBr_4

C. MBr_3

D. MBr_2

Answer: C

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27. The first ionisation potentials of four consecutive elements present in the second period of the periodic table are 8.3, 11.3, 14.5

and 13.6 eV respectively. Which one of the following is the first ionisation potential (in eV) of nitrogen ?

A. 13.6

B. 11.3

C. 8.3

D. 14.5

Answer: D

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28. H-H, X-X and H-X bond energies are 104 Kcal/mole 60Kcal/mole and 101Kcal/ mole. Assuming the electronegativity of hydrogen to be 2.1 the electronegativity of unkonwn element X is $\left(\sqrt{19} = 4.36\right)$

A. 3.5

B. 3

C. 4

D. 2.5

Answer: B

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29. The ionisation energy and electron affinity of an element are 13.0ev and 3.8ev respectively. Its electronegativity is

A. 2.8

B. 3

C. 3.5

D. 4

Answer: B

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30. If the ionisation energy and electron affinity of an element are 275 and 86 Kcals mol^{-1} respectively, the electronegativity of that element on Mulliken scale is

A. 2.8

B. 0

C. 4

D. 1.9

Answer: A

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31. The elements which show both positive and negative oxidation states. i) N ii) H iii) O iv) F

A. i, ii, iii

B. iii and iv

C. ii and iv

D. only iv

Answer: A

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32. Match the following two lists given below in view of higest oxidation state

LIST - 1	LIST - 2
A) Mn	1) +5
B) Os	2) +6
C) P	3) +4
D) Cr	4) +8
	5) +7

The correct match is

	A	B	C	D
1)	5	4	1	2
2)	5	1	4	2
3)	4	3	2	1
4)	3	1	4	2

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33. Strongest reducing agent and strongest oxidising agent are respectively

A. Cs, Cl_2

B. Li, Cl_2

C. Cs, F_2

D. Cs, O_2

Answer: C

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34. Which of the following statement is correct

A. X^+ ion is larger than X^-

B. X^- ion is larger than X

C. X^+ and X^- ions have same size

D. X^+ ion is larger than X

Answer: B

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35. The radius of $La^{3+}(Z = 57)$ is $1.06A^{\circ}$. Which one of the following given values will be closest to the radius of Lu^{3+}

A. $0.85A^{0}$

B. $1.60A^{0}$

C. $1.40A^{0}$

D. $1.06A^{0}$

Answer: A

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36. (A): According to Mendeleeff atomic weight of 'Be' is 9.1 but experimentally it is '7'

(R): In the atomic weight of Be valency was taken as '3' by Mendeleeff.

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: D

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37. Chloride of an element A gave a neutral solution in water. In the periodic table the element A belongs to

A. First group

B. Third group

C. Fifth group

D. Fourth group

Answer: A

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38. Which one of the following relations is correct with respect to first (I) and second (II) ionisation potentials of Na and Mg?

A. $I_{Na} > I_{Mg}$

B. $I_{Mg} = II_{Na}$

C. $II_{Mg} > II_{Na}$

D. $II_{Na} > II_{Mg}$

Answer: D

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39. The incorrect statement among the following is

A. The first ionisation potential of Al is less than the first ionisation potential of Mg

B. The second ionisation potential of Mg is greater than the second ionisation

potential of Na

C. The first ionisation potential of Na is less than the first ionisation potential of Mg

D. The third ionisation potential of Mg is greater than the third ionisation potential of Al

Answer: B

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40. The decreasing order of second ionisation potential of K, Ca, Ba is

A. $K > Ca > Ba$

B. $Ca > Ba > K$

C. $Ba > K > Ca$

D. $K > Ba > Ca$

Answer: A

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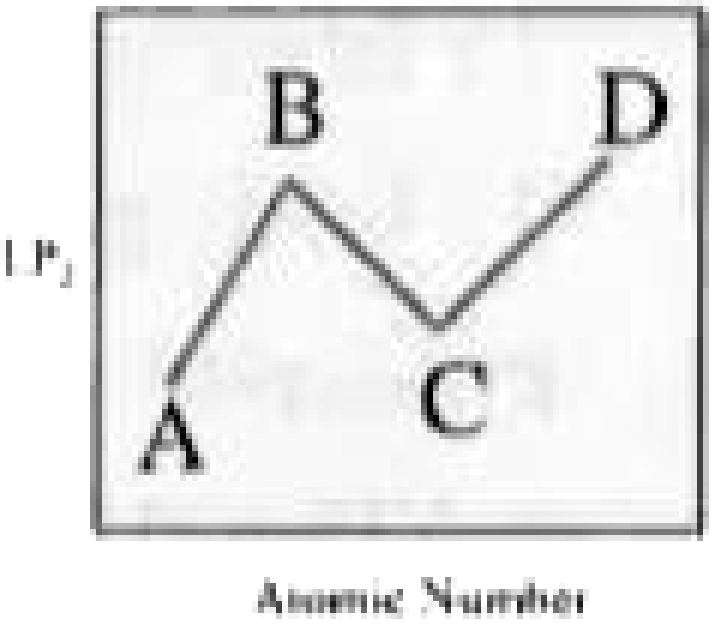
41. For four elements the IP_2 curve is shown.

In the graph the elements represented by A, B, C and D are



A. Na, Mg, Al, Si

B. Mg, Al, Si, P

C. Al, Si, P, S

D. Si, P, S, CI

Answer: B

42. Regarding ionization potential some statement are given

a) Ionization process is an endothermic process

b) The order of IP values is $IP_1 < IP_2 < IP_3$

c) With increases in the number of electrons in the shells. The I.P. values gradually increase

d) Stable configuration leads to greater I.P value e) In a period the I.P. value decreases from left to right In the above statements

A. A, B, C are correct

B. A, B, D are correct

C. A, B, C, D are correct

D. A, B are correct

Answer: C

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43. The electron affinity values(in $KJ\text{mole}^{-1}$) of three halogens x, y and z are respectively $-349, -333$ and -325. Then x, y and z respectively are

A. F_2, Cl_2 and Br_2

B. Cl_2, F_2 and Br_2

C. Cl_2, Br_2 and F_2

D. Br_2, Cl_2 and F_2

Answer: B

44. Regarding electronegativity

i) The element with maximum electro negativity : Fluorine

ii) In Pauling scale, the reference element is : Hydrogen

iii) Elements with stable configuration have high electronegativity

A. All are correct

B. only i & ii are correct

C. only i & iii are correct

D. only ii is correct

Answer: B

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45. The bond energies of H - H, X - X and H - X are 104 K.Cal, 38K.Cal and 138 K.Cal respectively the electronegativity of 'X' is $\left[\sqrt{67} = 8.18\right]$

A. 3

B. 3.5

C. 3.8

D. 1.7

Answer: C

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46. Match the following in view of highest values

LIST - 1	LIST - 2
A) Ionisation potential	1)Chlorine
B) Electro negativity	2) Caesium
C)Electron affinity	3) Helium
D)Oxidation state	4) Fluorine
	5) Osmium

The correct match is

	A	B	C	D
1)	4	3	2	1
2)	3	4	1	5
3)	1	2	3	4
4)	2	1	4	5

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47. The atomic numbers of elements A, B, C and D are Z1, Z, Z + 1 and 2 + 2 respectively. If 'B' is a noble gas, choose the correct answers

from the following statements

Q (1) 'A' has higher electron affinity.

Q (2) 'C exists in + 2 oxidation state.

Q (3) 'D' is an alkaline earth metal.

A. (a) and (b)

B. (b) and (c)

C. (a) and (c)

D. (a), (b) and (c)

Answer: C

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48. Larger number of oxidation states are exhibited by the actinoids than those by the lanthanoids. This can be best explained as

A. lesser energy difference between 5f and 6d than between 4f and 5d orbitals

B. more energy difference between 5f and 6d than between 4f and 5d orbitals

C. more reactive nature of the actinoids than the lanthanoids

D. 4f orbitals more diffused than the 5f orbitals

Answer: A

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49. Match the following correctly

LIST - 1	LIST - 2
A) $Ba(OH)_2$	1) acidic
B) CO	2) basic
C) CrO_3	3) amphoteric
D) $Be(OH)_2$	4) Neutral
	5) Suboxide

The correct match is

	A	B	C	D
1)	2	1	3	4
2)	3	1	2	4
3)	2	4	1	3
4)	1	3	2	4

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50. Match the following correctly

LIST - 1	LIST - 2
A) Li	1) Al
B) Si	2) C
C) Be	3) B
	4) Mg

The correct match is

	A	B	C		A	B	C
1)	1	3	4	2)	3	1	4
3)	4	1	3	4)	4	3	1

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51. Match the following correctly

LIST - 1	LIST - 2
A) MgO	1) Amphoteric
B) BeO	2) Acidic
C) P_2O_5	3) Neutral
D) CO	4) Basic

The correct match is

	A	B	C	D
1)	1	2	3	4
2)	4	1	2	3
3)	4	1	3	2
4)	2	3	4	1

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52. Which of the following is not correct in the case of Be and Al ?

A. both are rendered passive by conc. HNO_3

B. carbides of both give methane on hydrolysis

C. both give hydroxides which are basic

D. both give covalent chlorides

Answer: C

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53. Observe the following statements.

Q I. The physical and chemical properties of elements are periodic functions of their electronic confirguration.

Q II. Electronegativity of fluorine is less than the electronegativity of chlorine.

Q III. Electropositive nature decreases from top to bottom in a group.

The correct answer is

A. I, II and III are correct

B. Only I is correct

C. Only I and II are correct

D. Only II and III are correct

Answer: B

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54. The following are some statements about periodic properties

i) Atomic size decreases from left to right in a

period

ii) The EA of 2nd element in VA, VIA, VIIA are greater than the first element

iii) Acidic nature of oxides decreases and basic nature of oxides of elements increases down the group

A. all are correct

B. only i and ii are correct

C. only iii is correct

D. ii & iii are correct

Answer: A

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55. The following are some statements about diagonal relationship

i) This is due to nearly same size, electro negativity and same polarising power

ii) Li has similar properties with Mg

iii) BeO, Al_2O_3 are amphoteric in nature

A. all are correct

B. only ii & iii are correct

C. iii & i are correct

D. only ii is correct 1

Answer: A

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56. Three elements, X,Y and Z belong to the same period. Their oxides are acidic, amphoteric and basic respectively. The order of these elements in the periodic table is

A. X,Y,Z

B. Y,Z,X

C. X,Z,Y

D. Z,Y,X

Answer: D

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57. The elements 'X', 'Y' and 'Z' form oxides which are acidic, basic and amphoteric respectively. The correct order of their electro negativity is

A. $X > Y > Z$

B. $Z > Y > X$

C. $X > Z > Y$

D. $Y > X > Z$

Answer: C

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58. The formation of O^{-2} and N^{-3} are endothermic, but metal oxides and metal nitrides are formed easily because

A. metal ions are easily formed

B. High lattice energy of these compounds

C. Repulsion between ions

D. metals lose electrons easily

Answer: B

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59. Some statements are given below. Among them, the correct statement are

a) All transition elements are d - block

elements

b) All d- block elements are transition elements

c) Helium is a inert gas

d) Aluminium is a respresentative element

A. All are correct

B. Only a, c and d are correct

C. Only b,c and d are correct

D. Only a and c are correct

Answer: B

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60. Ce-58 is member of

A. s-block

B. p-block

C. d-block

D. f- block

Answer: D

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61. The radii of F, F^-, O, O^{2-} are in the order

A. $O^{2-} > F^- > O > F$

B. $O^{2-} > F^- > F > O$

C. $F^- O^{2-} > F > O$

D. $O^2 > O > F^- > F$

Answer: A

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62. O^{2-} and Si^{4+} are isoelectronic ions. If the ionic radius of O^{2-} is 1.4 $\overset{o}{A}$, the ionic radius of Si^{4+} will be

A. $1.4A^{\circ}$

B. $0.41A^{\circ}$

C. $2.8A^{\circ}$

D. $1.5A^{\circ}$

Answer: B

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63. Ionic radii (in $\overset{o}{A}$) of As^{3+}, Sb^{3+} and Bi^{3+} follow the order

A. $As^{+3} > Sb^{+3} > Bi^{+3}$

B. $Sb^{+3} > Bi^{+3} > As^{+3}$

C. $Bi^{+3} > As^{+3} > Sb^{+3}$

D. $Bi^{+3} > Sb^{+3} > As^{+3}$

Answer: D

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64. The order of decrease in atomic radii for Be, Na and Mg is

A. $Be > Mg > Na$

B. $Na > Mg > Be$

C. $Mg > Na > Be$

D. $Mg > Be > Na$

Answer: B

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65. Lanthanide contraction occurs because

A. Zr and Hf have same radius

B. Zr and Zn have the same oxidation state

C. Zr and Y have same radius

D. Zr and Nb have similar oxidation state

Answer: A

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66. Radius of Cs^+ ion is less than that of

A) Fluoride ion

B) Chloride ion

C) Bromide ion

A. A is correct

B. A and B are correct

C. B and C are correct

D. All are correct

Answer: D

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67. The sizes of A, A^+ and A^- follows the order

A. $A^+ > A^- > A$

B. $A^- > A^+ > A$

C. $A^- > A > A^+$

D. $A > A^- A^+$

Answer: C

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68. Which of the following has the largest atomic radius ?

A. Be^{2+}

B. Sr^{2+}

C. Ca^{2+}

D. Mg^{2+}

Answer: B

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69. Which of the following grouping represents a collection of iso-electionic species?

A. Ca^{2+}, Cs^{2+}, Br

B. Na^{+}, Ca^{2+}, Mg^{2+}

C. N^{3-}, F^{-}, Na^{+}

D. Be, Al^{3+}, Cl^{+}

Answer: C

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70. Which is not related to lanthanide contraction

A. Atomic radii of 4d and 5d series elements are similar

B. 4d and 5d series elements have different properties

C. I.P. values of 4d series elements are less than that of 5d series

D. Lanthanides exhibit +3 oxidation state

Answer: B

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71. A trend common to both groups 1 and 17 elements in the periodic table as atomic number increases is

A. Increase in oxidising power

B. Increase in atomic radius

C. Increase in maximum valency

D. Increase in reactivity with water

Answer: B

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72. The screening effect of d-electrons is

A. equal to p - electrons

B. much more than p - electrons

C. same as f - electrons

D. less than p - electrons

Answer: D

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73. (A): The first ionisation energy of B is less than that of Be

(R) : The penetration ability of s- electrons is higher than that of p- electrons The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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74. (A): The second ionisation energy of 'O' is greater than that of second ionisation energy of 'N'

(R): The half filled p-orbitals cause greater stability for an atom. The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: A

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75. The species with largest ionisation potential

A. Li^+

B. Mg^+

C. Al^+

D. Ne

Answer: A

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76. Which of the following has highest first ionisation potential?

A. Al

B. Si

C. K

D. P

Answer: D

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77. The electronic configuration of elements A, B, and Care $[He]2s^1$, $[Ne]3s^1$ and $[Ar]4s^1$ respectively. Which one of the following order is correct for the first ionisation potentials (in $KJmol^{-1}$) of A, B and C?

A. $A > B > C$

B. $C > B > A$

C. $B > C > A$

D. $C > A > B$

Answer: A

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78. The first ionisation potential is maximum for

A. Lithium

B. Sodium

C. Potassium

D. Hydrogen

Answer: D


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79. Second ionization energy of an element is higher than its first ionization energy Why ?

A. Size of the cation is higher than neutural atom

B. Nuclear charge is high in cation

C. Effecive nuclear charge is more for cation

D. Change in bond energy

Answer: C

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80. (A): The second electron affinity f oxygen is endothermic.

(R): Oxygen is the second highest electronegative element The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: B

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81. Consider the elements N, P, O and S and arrange them in order of :

(b) Increasing negative electron gain enthalpy

A. $N < O < S < Cl$

B. $O < N < Cl > S$

C. $O = Cl < N = S$

D. $O < S < Cl < N$

Answer: A

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82. The process requiring the absorption of energy is

A. $F \rightarrow F^-$

B. $Cl \rightarrow Cl^-$

C. $O^- \rightarrow O^{-2}$

D. $H \rightarrow H^-$

Answer: C

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83. In which block of the periodic table the electronegativities of the elements are very similar ?

A. s

B. p

C. d

D. f

Answer: C

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84. Electronegativity is a measure of the capacity of an atom to

A. attract electrons

B. attract protons

C. repel electrons

D. repel protons

Answer: A

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85. The most electronegative element is

A. O

B. Cl

C. F

D. N

Answer: C

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Objective Exercise 3

1. Some statements are given. Among them the correct statements are

(a) IP_2 of sodium is greater than that of Magnesium

(b) IP_2 of lithium is greater than IP_1 of Helium

(c) IP_2 of sodium is greater than IP_1 of Neon

(d) IP_1 of oxygen is greater than that of Nitrogen

A. All are correct

B. Only a, b and c are correct

C. Only a,b are correct

D. Only a, d are correct

Answer: B

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2. Elements X, Y and Z have atomic numbers 19, 37 and 55 respectively. Which of the following statements is true about them?

A. Their ionization potential would increase with increasing atomic number

B. Y' would have an ionization potential between those of X and Z

C. Z would have the highest ionization potential

D. Y would have the highest ionization potential

Answer: B

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3. Define the mordern periodic law . Discuss the construction of the long form of the periodic table .

A. It reflects the sequence of filling the electrons in the order of sub energy levels sp,d and f

B. It helps to predict the stable valency states of the element

C. It reflects trends in physical and chemical properties of the elements

D. It helps to predict the relative ionicity of the bond between any two elements

Answer: B

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4. The compound of vanadium has magnetic moment of 1.73 BM. The vanadium chloride has the formula:

A. VCl_2

B. VCl_3

C. VCl_4

D. VCl_4

Answer: C

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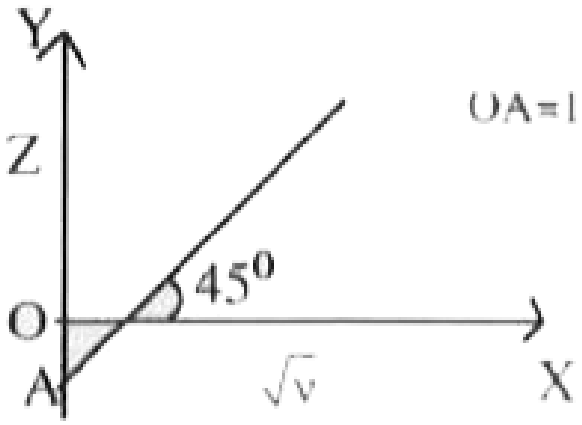
5. The frequency of the characterstic X ray of K_α line of metal target 'M' is 2500 cm^{-1} and the graph between $\sqrt{v}$ Vs 'z' is as follows, then atomic number of M is



A. 49

B. 50

C. 51

D. 25

Answer: C

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6. $(IE)_1$ and $(IE)_2$ of $Mg_{(g)}$ are 740, 1540 kJ mol^{-1} . Calculate percentage of $Mg^{+}_{(g)}$ and $Mg^{2+}_{(g)}$ if 1 g of $Mg_{(s)}$ absorbs 50.0 kJ of energy.

A. $\% Mg^{+} = 50\% \ \% Mg^{+2} = 50\%$

B. $\% Mg^{+} = 70.13\% \ \% Mg^{+2} = 25\%$

C. $\% Mg^{+} = 75\% \ \% Mg^{+2} = 25\%$

D. $\% Mg^{+} = 60\% \ \% Mg^{+2} = 40\%$

Answer: B

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7. Use (IE) and (EA) listed below to determine whether the following process is endothermic exothermic.

$Mg_{(s)} + 2F_{(g)} \rightarrow Mg^{2+}_{(g)} + 2F^{-}_{(g)}$

$(IE)_1$ of $Mg_{(g)} = 737.7\text{kJ mol}^{-1}$

$(IE)_2$ of $Mg_{(g)} = 1451\text{kJ mol}^{-1}$

(EA) of $F_{(g)} = -328\text{kJ mol}^{-1}$

A. Exo

B. Endo

C. both

D. None

Answer: B

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8. If Aufbau rule is not followed, K - 19. will be placed in

A. s

B. p

C. d

D. f

Answer: C

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9. $M_{(g)} \rightarrow M^{+}_{(g)} + e^{-}, \Delta H$=100 eV ,

$M_{(g)} \rightarrow M^{2+}_{(g)} + 2e^{-}, \Delta H$=250 eV

Which is incorrect statement ?

A. $I_1 of M_{(g)} is 100 eV$

B. $I_1 of M^{+}_{(g)} is 150 eV$

C. $I_2 of M_{(g)} is 250 eV$

D. $I_2 of M_{(g)} is 150 eV$

Answer: C

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10. Which of the following atomic number is named as Ununtrium.

A. 103

B. 104

C. 110

D. 113

Answer: D

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11. The IUPAC name of $_{104}Rf$ is

A. Unnil hexium

B. Unnil quadrium

C. Unun quadrium

D. Unun pentium

Answer: B

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12. The IUPAC name of $_{107}Bh$ is

A. Unnil heptium

B. Unnil septium

C. Unnil hexium

D. Unnil bium

Answer: B

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13. Screening constant depends upon

A) Number of inner shells

B) Number of electrons in inner shells

A. A only

B. B only

C. Both A and B

D. Neither A nor B

Answer: C

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14. Screening constant of Be is 2.05 and that of B is

A. 1.7

B. 2.05

C. 2.4

D. 5.0

Answer: C

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15. Write any two properties which are decreased from top to bottom in a group ?

A. increaes

B. decreases

C. constant

D. can not be predicted

Answer: A

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16. Screening by inner electrons will be more effective in

A. Mg

B. K

C. Sr

D. Cs

Answer: D

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17. Correct order of first ionisation potentials

A. $K < Na$

B. $Ca < K$

C. $Mg < Ca$

D. $Li < Be$

Answer: A

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18. In a period from left to right

A) nuclear charge increases

B) effective nuclear charge increases

C) atomic size decreases

D) Ionisation potential increases

Correct among the above are

A. A, B

B. B, C

C. A, C, D

D. A, B, C, D

Answer: D

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19. Relation between oxidation numbers and electronegativity is given by

A. Pauling's scale

B. Alfred scale

C. Mulliken's scale

D. Slater's scale

Answer: B

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20. Screening effect influences

A) atomic radius

B) Ionisation enthalpy

C) electron gain enthalpy

A. A,B

B. B,C

C. A,C

D. A,B,C

Answer: D

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21. {0} is a set contains the element.....

A. $2E_1 - E_2$

B. $E_1 - E_2$

C. $E_1 - 2E_2$

D. $(E_1 + E_2)/2$

Answer: A

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22. Number of unpaired electrons in Gd(Z =64) and the net electrons spin are

A. $7.\ 3.5$

B. $8,\ 3$

C. $6,\ 3$

D. $8,\ 4$

Answer: D

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23. For the process

$X_{(g)} + e^- \rightarrow X^-_{(g)}, \Delta H = x$ and

$X^-_g \rightarrow X_g + e^-, \Delta H = y$

Select correct alternat :

A. ionisation energy of $X^{-i}_{(g)} sY$

B. electron affinity of $X_{(g)} isx$

C. electron affinity of $X_{(g)} is - Y$

D. all the correct statements.

Answer: D

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24. Some statements are given regarding nature of oxides

(i) In second period, nitrogen form strongest acidic oxide

(ii) In third period, sodium forms strongest basic oxide

(iii)Oxides of metalloids are generally amphoteric in nature

A. I and II are correct

B. II and III are correct

C. I and III are correct

D. I, II and III are correct

Answer: A

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25. When an electron adds on F atom, It becomes _____

A. It acts as a reducing agent

B. It loses electrons

C. Its ionic radius becomes larger

D. It accepts electrons

Answer: C

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26. On going down a main subgroup in the periodic table (example Li to Cs in IA or Be to Ra in IIA) the expected trend of change in atomic radius is a

A. Continuous increase

B. Continuous decrease

C. An increase followed by decrease

D. A decrease followed by increase

Answer: A

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27. Identify the correct statement

A. Filling of 5d orbital begins with Hf in 5th period

B. Filling of 4f orbital begins with Ce in 6th period

C. Filling of 5d orbital begins with La in 5th period

D. Filling of 4f orbital begins with La in 6th period

Answer: B

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28. Identify the correct order in which the ionic radius of the following ions increases:

(I) F^- , (ii) Na^+ , (III) N^{3-}

A. III, I,II

B. I,II,III

C. II,III,I

D. II,I,III

Answer: D

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29. The atomic radius decreases in a period due to

A. Increase in nuclear attraction

B. Decrease in nuclear attraction

C. Increase in number of electrons

D. Decrease in number of electrons

Answer: A

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30. Among the following, the number of elements showing only one non-zero oxidation state is O,Cl,F,N,P,Sn,Tl,Na and Ti.

A. 1

B. 3

C. 2

D. 4

Answer: C

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Exercise On Passage

1. PASSAGE - 1: In Mendeleeff's periodic table elements were classified on the basis of atomic weight & in modern periodic table on the atomic number. The lighter elements of 2 & 3 periods show similarities in their properties called diagonal relationship

1. Which of the following element is not present in Mendeleeff's periodic table

A. Carbon

B. Chlorine

C. Argon

D. Potassium

Answer: C

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2. PASSAGE - 1: In Mendeleeff's periodic table elements were classified on the basis of atomic weight & in modern periodic table on

the atomic number. The lighter elements of 2 & 3 periods show similarities in their properties called diagonal relationship

The atomic number of element separated from main body of periodic table is

A. 64

B. 20

C. 46

D. 57

Answer: A

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3. PASSAGE - 1: In Mendeleeff's periodic table elements were classified on the basis of atomic weight & in modern periodic table on the atomic number. The lighter elements of 2 & 3 periods show similarities in their properties called diagonal relationship

Due to digonal relation which pair are amphoteric in nature

A. Li_2, O, MgO

B. BeO, MgO

C. $B_2, O_3Al_2O_3$

D. BeO, Al_2O_3

Answer: D

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4. PASSAGE - 2 : In periodic table there are nearly 110 elements are present majority of elements are present in solid state. There is no separate placement for isotopes of elements

in periodic table. The atomic weight of an element is the average atomic weight of isotopes.

In periodic table the liquid elements at room temperature are

A. Cd,Cl_2

B. H_2O, Hg

C. Hg, Br_2

D. O_2N_2

Answer: B

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5. PASSAGE - 2 : In periodic table there are nearly 110 elements are present majority of elements are present in solid state. There is no separate placement for isotopes of elements in periodic table. The atomic weight of an element is the average atomic weight of isotopes.

The element which exhibits highest number of stable isotopes

A. Sn

B. Pb

C. Fe

D. Pt

Answer: A

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6. PASSAGE - 2 : In periodic table there are nearly 110 elements are present majority of elements are present in solid state. There is no separate placement for isotopes of elements

in periodic table. The atomic weight of an element is the average atomic weight of isotopes.

Among IIA,HIA, VA,VIA, VIIA groups gaseous elements are present in

A. IA,IIA,VA only

B. IIIA,VA,VIIA only

C. VA,VIA,VIIA only

D. IIIA,VA,VIA only

Answer: C

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7. PASSAGE - 3 : In modern periodic table there is gradation in the properties of elements. In a period the Ionisation energy, Electron affinity, Electro negativity, Non-Metallic nature increases. In a group the atomic size, metallic nature, reducing properties and densities of elements increases.

The pair of elements with equal electro negativities

A. Na,K

B. N,Cl

C. O,S

D. F,C

Answer: B

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8. PASSAGE - 3 : In modern periodic table there is gradation in the properties of elements. In a period the Ionisation energy, Electron affinity, Electro negativity, Non-Metallic nature

increases. In a group the atomic size, metallic nature, reducing properties and densities of elements increases.

Whic pair of elements have positive electron affinity values

A. Be,Mg

B. N,P

C. Ca,Sr

D. Ne,Ar

Answer: A

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9. PASSAGE - 3 : In modern periodic table there is gradation in the properties of elements. In a period the Ionisation energy, Electron affinity, Electro negativity, Non-Metallic nature increases. In a group the atomic size, metallic nature, reducing properties and densities of elements increases.

In the compunds KO_2, Cr_2, O_3, SO_2 and Cl_2O_3 Which element shows more valency with respect to oxygen

A. K

B. Cr

C. S

D. Cl

Answer: C

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10. Justify the inclusion of alkali metals in the same group of the periodic table with

reference to the following.

(ii) Reducing nature.

A. Li

B. Mg

C. Ba

D. K

Answer: A

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11. PASSAGE - IV : In periodic table metals show high reducing ability and non-metals show high oxidizing ability. The properties of metalloids in between metals and non-metals. In a group from top to bottom the reducing ability increases and in a period from left to right oxidizing ability increases.

In which of the following set both are metalloids

A. As,Se

B. Si,P

C. Mg,Al

D. Sn,Pb

Answer: A

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12. PASSAGE - IV : In periodic table metals show high reducing ability and non-metals show high oxidizing ability. The properties of metalloids in between metals and non-metals. In a group from top to bottom the reducing

ability increases and in a period from left to right oxidizing ability increases.

F_2 is strong oxidizing agen than Cl_2 due to

A. Bond energy of $F_2 < Cl_2$

B. Electroneativity of $Cl > F$

C. I.P of $F > Cl$

D. Non-metallic nature of F is more

Answer: A

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