

CHEMISTRY

BOOKS - R SHARMA CHEMISTRY (HINGLISH)

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN ELEMENTS

Example

1. Sodium has atomic weight 23amu and density 0.97gcm^{-3} . What is its atomic volume?

Strategy: Use Eq. directly to obtain the atomic volume.

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2. For chlorine molecule, the $Cl - Cl$ bond length is 198 pm. Find the covalent radius of chlorine?

Strategy: Use Eq. to obtain directly the covalent radius of chlorine atom.

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3. The covalent radii for carbon and chlorine are $0.077nm$ and $0.099nm$, respectively. Find the $C - Cl$ bond length.

Strategy : Use Eq to obtain directly the $C - Cl$ bond distance.

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4. The $C - Si$ single-bond distance is SiC (carbondum) or $(CH_3)_4Si$ is 194pm and the covalent radius of C is 77pm. Find the

covalent radius of silicon.

Strategy: Use Eq. to obtain directly the covalent radius of silicon.

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5. Determine the energy needed to convert all the atoms of aluminium to aluminium trivalent ions present in 27mg of aluminium vapors using the data:

$$\Delta_i H_1 = 577\text{kJmol}^{-1}, \Delta_i H_2 = 1820\text{kJmol}^{-1}, \Delta_i H_3 = 2750\text{kJmol}^{-1}$$

Strategy: Find the number of moles of Al atoms present in 27mg of Al vapor and multiply it with energy required to convert 1mol of Al atoms into 1mol of Al^{3+} ions. The energy required is the sum of first, second, and third ionization enthalpies.

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6. 1g of magnesium vapor absorbs 50kJ of light energy. Find the percentage of $\text{Mg}^+(g)$ and $\text{Mg}^{2+}(g)$ in the vapor if $\Delta_i H_1 = 738\text{kJmol}^{-1}$ and $\Delta_i H_2 = 1450\text{kJmol}^{-1}$.

Strategy: Find the number of moles of Mg atoms present in 1g of Mg vapor. Find the moles of Mg^+ and Mg^{2+} formed by absorbing energy. Use the following ratio to calculate the percentage of $\text{Mg}^+(g)$:

$$\% \text{Mg}^+(g) = \frac{n_{\text{Mg}^+(g)}}{n_{\text{Mg}(g)}} \times 100 \%$$

Finally, $\% \text{Mg}^{2+} = 100 \% - \% \text{Mg}^+(g)$

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Follow Up Test 1

1. Triads are groups of _____ closely related elements.

A. thirteen

B. thirty

C. three

D. thirty nine

Answer: C

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Follow Up Test

1. According to the law of triads, when chemically similar elements are arranged in groups of three in the order of increasing atomic weights, then the _____ element has the atomic weight and properties roughly the average of the other two elements.

A. first

B. middle

C. third

D. every

Answer: B



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2. Which of the following sets of three elements (triads) follow Döbereiner's relationship referred to as the law of triads?

(i) *Ca, Sr, Br* (ii) *Li, Na, K*

(iii) *S, Se, Te* (iv) *Cl, Br, I*

A. (i), (ii), (iii)

B. (i), (iii), (iv)

C. (ii), (iii), (iv)

D. (i), (ii), (iii), (iv)

Answer: D



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3. In telluric screw, element which differed from each other by a multiple of ___ units of atomic weight fell along the same perpendicular line and showed nearly the same properties.

A. 18

B. 16

C. 17

D. 18

Answer: B



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4. The English chemist John Alexander Newlands in 1866 profounded the

- A. law of triads
- B. law of octaves
- C. law of pentaves
- D. law of hexaves

Answer: B

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5. Newland's law of octaves seemed to be flawless only for elements up to __u.

- A. 45
- B. 30

C. 40

D. 35

Answer: C

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6. With the discovery of____, the properties of the eighth element were no longer similar to those of the first one in Newland's table?

A. noble gases

B. *d*-block elements

C. *f*-block elements

D. halogens

Answer: A

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7. Name the scientist who first arranged the elements in rows and columns?

- A. William Proust
- B. John *A. R.* Newlands
- C. Stanislao Cannizzaro
- D. Dimitri Mendeleev

Answer: B

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8. Lothar Meyer used the physical property such as _____ to construct a plot showing similarities among particular sets of elements.

(i) atomic volume (ii) melting point

(iii) boiling point

A. (i)

B. (ii), (iii)

C. (i), (ii)

D. (i), (ii), (iii)

Answer: D

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9. Mendeleev's system was more elaborate than that of Lohar Meyer because he used a broader range of _____ to classify the elements.

A. physiological properties

B. physical properties

C. physical and chemical properties

D. chemical properties

Answer: C

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10. Atomic volume is

A. $\frac{\text{atomic weight}}{\text{density}}$

B. $\frac{\text{gram atomic weight}}{\text{density}}$

C. $\frac{\text{atomic mass}}{\text{density}}$

D. $\frac{\text{atomic number}}{\text{density}}$

Answer: B

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11. Lothar Meyer plotted a graph between the atomic volumes and atomic weights of the elements and observed that the elements with similar properties occupied similar positions on the curve. The elements _____ are the most reactive.

- A. at the peaks
- B. at the troughs
- C. occupying the descending positions on the curve
- D. occupying the ascending position on the curve

Answer: A

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12. On the basis of the atomic volume curve, Lothar Meyer proposed that the _____ properties of the elements are a periodic function of their atomic weights.

A. chemical

B. physical

C. physiological

D. both(1)and(2)

Answer: B



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13. When Mendeleev started his work on periodic classification of elements, only_____elements were known.

A. 30

B. 63

C. 50

D. 70

Answer: B

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14. The formula of the hydrides and oxides formed by the various elements were made on the basis of Mendeleev's classification of elements because

- A. these formulaws were the simplest
- B. they were easy to work out
- C. hydrogen and oxygen formed compounds with almost all the then known of elements
- D. all of these

Answer: C

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15. Mendeleev's arranged the then known elements in horizontal rows and vertical columns of a table in the order of their increasing_____in such a way that the elements with similar properties occupied the same vertical column or group.

A. atomic density

B. atomic volume

C. atomic number

D. atomic mass

Answer: D



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16. Mendeleev's classification was a great improvement over contemporary tabulation of the elements by Newlands and Lothar Meyer because

- (i) it grouped the elements together more accurately in vertical columns.
- (ii) it left gaps for elements which were yet to be discovered in nature.
- (iii) it made possible the predication of the properties of elements that had not yet been discovered.
- (iv) it predicted that atomic masses of certain elements were incorrectly determined.

A. (i), (ii), (iii), (iv)

B. (ii), (iii), (iv)

C. (ii), (iii)

D. (ii), (iv)

Answer: A



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17. Which of the following elements were not known when Mendeleev published his periodic table?

A. Lanthanoids

B. Actinoids

C. Noble gases

D. Noble metals

Answer: C

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18. In Mendeleev's modified periodic table, there are _____ vertical column called groups.

A. seven

B. nine

C. eight

D. six

Answer: B

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19. In Mendeleev's periodic table group *VIII* contains _____ elements.

A. six

B. five

C. seven

D. nine

Answer: D

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20. In Mendeleev's original periodic table, there were six horizontal rows (called series) further subdivided to give a total of 12. In Mendeleev's modified periodic table, there are _____ horizontal rows (called periods).

A. seven

B. eight

C. nine

D. ten

Answer: A



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21. Mendeleev's periodic table simplified and systematized the study of the elements and their compounds since

- A. it was possible to predict the properties of unknown elements
- B. it was possible to predict the properties of unknown compounds
- C. their properties could now be studied as groups (or families) rather than individual
- D. both(1)and(2)

Answer: C

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22. One especially farishted feature of Mendeleev's accomplishment was his realization that some elements were missing from the table. He proposed the existence of over _____new elements in nature.

A. five

B. ten

C. four

D. eight

Answer: B



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23. Mendeleev's propdicted the properties of _____unknown elements.

A. seven

B. two

C. five

D. three

Answer: D



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24. Mebdeleev's periodic table has helped in correcting the doubtful atomic masses of some elements such as

(i) beryllium (ii) indium

(iii) tellurium (iv) gold

A. (i), (ii), (iii), (iv)

B. (i), (ii)

C. (i), (iii)

D. (ii), (iii), (iv)

Answer: A



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25. The position of hydrogen in Mendeleev's periodic table is not fixed but is anomalous because it resembles the elements of both groups:

A. *IIA* and *VIIA*

B. *IA* and *IVA*

C. *IA* and *VIIA*

D. *IIA* and *IVA*

Answer: C

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26. In Mendeleev's table, although most of the elements were placed in the order of increasing atomic masses, some pairs of the elements _____ were placed in the inverted order masses precede the elements with lower atomic mass.

(i) argon and potassium (ii) cobalt and nickel

(iii) tellurium and iodine

A. (i), (iii)

B. (i), (ii)

C. (ii), (iii)

D. (i), (ii), (iii)

Answer: D



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27. Since its birth in 1869, the Mendeleev periodic table has been discussed and revised many times. Spectroscopic and other discoveries have filled in the blanks left by Mendeleev and added a new column consisting of the noble gases. Finally, Mendeleev's

periodic table was discovered because it did not provide any place for

- A. tullotrups
- B. isotopes
- C. polymorphs
- D. all of these

Answer: B

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28. The empirical evolution of the periodic table reached its peak in 1913 when the English physicist _____ showed that atomic number is a more fundamental property of an element than its atomic mass.

- A. Winkler
- B. Nilson

C. Peter

D. Moseley

Answer: D

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29. Which of the following gives a straight line?

- A. A plot of \sqrt{V} (where V is the frequency of the prominent X -rays emitted) against atomic number (Z)
- B. A plot of \sqrt{V} against atomic mass
- C. A plot of V^2 against atomic mass
- D. A plot of V^2 against atomic number

Answer: A

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30. Which of the following correctly describes Moseley's law?

A. $v = a(Z - b)$

B. $v^2 = a(Z - b)$

C. $\sqrt{v} = a(Z - b)$

D. $\sqrt{v} = a(Z + b)$

Answer: C



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31. Modern periodic law states that the properties of the elements are periodic functions of their

A. electron numbers

B. proton numbers

C. neutron numbers

D. nucleon numbers

Answer: B



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32. The physical and chemical properties of the elements depend upon their atomic number rather than atomic masses because

A. an atom consists of a nucleus surrounded by electrons

B. atomic mass is a nuclear property and depends upon the number of protons and neutrons in the nucleus while atomic number implies the number of electron in the extranuclear part

C. the chemical properties of the elements depend upon the interaction between the atom and the reagent. The nucleus is deep inside the atom, shielded by electrons in the extranuclear part while electrons are exposed to the reagent

D. Both(1)and(2)

Answer: C



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33. The cause of periodicity in properties of the elements is the repetition of _____ after certain regular intervals.

A. similar penultimate shell electronic configuration

B. similar antepenultimate shell electronic configuration

C. similar outermost shell electronic configuration

D. similar valence shell electronic configurations

Answer: D



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34. Which of the following numbers are called magic numbers?

A. 2, 8

B. 2, 8, 18

C. 2, 8, 18, 32

D. 2, 8, 18, 27

Answer: C



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35. The short form of the modern periodic table of the elements (also called Bohr's table) is the most convenient and widely used version of the periodic table. It consists of _____ horizontal rows called periods and _____ vertical columns called groups.

A. 7, 18

B. 8, 16

C. 6, 15

D. 5, 13

Answer: A



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36. In the modified Mendeleev's periodic table, the 18 vertical columns were divided into _____ groups.

A. 15

B. 17

C. 16

D. 14

Answer: C



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37. In the short form of the modern periodic table, the period number corresponds to the highest_____quantum number of the elements in that period.

A. azimuthal

B. magnetic

C. spin

D. principal

Answer: D



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38. In the short form of the modern periodic table, the first period contains 2 elements. The subsequent periods consist of 8, 8, 18, 18, and 32 elements, respectively. The seventh period is incomplete and would have a theoretical maximum (on the basis of quantum numbers) of ____ elements.

A. 32

B. 100

C. 64

D. 50

Answer: A

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39. In the short form of the modern periodic table, _____ elements of both sixth and seventh periods are placed in separate panels at the bottom.

A. 14

B. 28

C. 30

D. 16

Answer: B

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40. The naming of the new elements had been traditionally the privilege of the discoverer (or discoverers) and the suggested name was ratified by the *IUPAC*. In recent years, disputes have arisen over the original discoveries of some of the elements of atomic number

A. 19 to 100

B. 90 to 95

C. 104 and above

D. 95 to 100

Answer: C



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41. Unnilennium is the systematic name for element having atomic number

A. 113

B. 115

C. 117

D. 109

Answer: D



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42. Which of the following elements have been duly synthesized and officially recognized by the *IUPAC*?

(i) 112(ii) 113(iii) 114(iv) 115

A. (i), (iii)

B. (ii), (iii)

C. (iii), (iv)

D. (i), (ii), (iii), (iv)

Answer: A

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

A. *Utz*

B. *Udn*

C. *Otz*

D. *Udn*

Answer: B

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44. Total number of element in each period is twice the number of _____ being filled.

A. shells

B. subshells

C. orbits

D. orbitals

Answer: D

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45. The first period ($n = 1$) starts with the filling of _____ subshell.

A. $1s$

B. $1p$

C. $1d$

D. $1f$

Answer: A



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46. The second period ($n = 2$) involves the filling up to electron in _____ atomic orbitals.

A. two

B. three

C. four

D. five

Answer: C



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47. The third period ($n = 3$) involves the filling up to electrons in _____ elements.

A. 8

B. 18

C. 27

D. 10

Answer: A

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48. The fourth period ($n = 4$) does not involve the filling up of electrons in _____ subshell.

(i) $4s$ (ii) $4p$

(iii) $4d$ (iv) $4f$

A. (iii)

B. (iv)

C. (iii), (iv)

D. (ii), (iii), (iv)

Answer: C



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49. The fifth period ($n = 5$) beginning with rubidium is similar to the fourth period and contains the $4d$ transition series starting at

A. scandium

B. yttrium

C. lanthanum

D. actinium

Answer: B

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50. The sixth period ($n = 6$) of the periodic table contains 32 elements and successive electrons enter _____ subshells.

A. $6s$, $6p$, $6d$, and $6f$

B. $6s$, $5f$, $4d$, and $6p$

C. $6s$, $5f$, $5d$, and $6p$

D. $6s$, $4f$, $5d$, and $6p$

Answer: D

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51. Which of the following lanthanoids does not contain $5d$ electron in its valence shell configuration?

A. *Pr*

B. *Ce*

C. *Gd*

D. *Lu*

Answer: A



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52. Which of the following actinoids contains $6d^2$ electrons in its valence shell electron configuration?

A. *Np*

B. *Th*

C. U

D. Pa

Answer: B



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53. Which of the following groups of periodic table contains maximum number of electron with diffeerect valence shell electron configuration?

A. 9

B. 8

C. 6

D. 10

Answer: D

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54. In s – block elements, the differentiating electron enters the _____ orbital.

A. ns

B. $(n - 1)s$

C. $(n - 2)s$

D. $(n + 1)s$

Answer: A

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55. On the basis of chemical behavior, how many element belong to the s – block of the periodic table?

A. 13

B. 15

C. 14

D. 12

Answer: D



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56. Although the elements in the periodic table are arranged according to electron structure, we make an exception for

A. neon

B. helium

C. radon

D. xenon

Answer: B

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57. Which of the following elements is placed on its own in the table to indicate its uniqueness?

A. Hydrogen

B. Fluorine

C. Copper

D. Xenon

Answer: A

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58. In p -block elements, the _____ orbitals are successively filled.

A. $(n + 1)p$

B. $(n - 1)p$

C. np

D. $(n + 2)p$

Answer: C



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59. The general valence shell electronic configuration of p -block elements is

A. ms^2np^{0-6}

B. ns^2np^{1-6}

C. $ns^{0-2}np^{1-6}$

D. $ns^{1-2}np^{1-6}$

Answer: B

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60. How many elements belong to the p -block of the periodic table on the basis of their chemical behavior?

A. 30

B. 31

C. 33

D. 32

Answer: D

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61. For many years, the group 18(*VIIIA*) elements were called inert gases because no chemical reactions were known for them. Now it is known that the heavier members do form compounds mostly with _____ .

(i) *F* (ii) *H*

(iii) *O* (iv) *C*

A. (*ii*), (*iii*)

B. (*iii*), (*iv*)

C. (*i*), (*iii*)

D. (*i*), (*ii*)

Answer: C



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62. *p* – block elements mostly form _____ compounds.

A. covalent

B. ionic

C. metallic

D. interstitial

Answer: A



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63. Which of the groups of p -block contains the maximum number of metals?

A. 17

B. 16

C. 13

D. 14

Answer: C

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64. Groups corresponding to the progressive filling of the ns and np orbitals represent the main group elements (also called representative elements). The total number of such groups in the periodic table is

A. 8

B. 7

C. 6

D. 5

Answer: A

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65. *d* – block elements are the elements in which the differentiating electron enters the ____ orbitals.

A. $(n + 1)d$

B. $(n - 1)d$

C. nd

D. $(n + 2)d$

Answer: B

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66. The general valence shell electronic configuration of transition elements is

A. $(n - 1)d^{0-10}ns^2$

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

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

D. $(n - 1)d^{1-10}ns^{0-2}$

Answer: D

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67. The transition metals are the elements in groups

A. 1*B* and 3*B* through 8*B*

B. 2*B* and 3*B* through 8*B*

C. 1*B* and 4*B* through 8*B*

D. 2*B* and 4*B* through 8*B*

Answer: A

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68. Which of the d -block elements has zero electrons in the ns subshell?

A. Pt

B. Pb

C. Ds

D. Mt

Answer: B



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69. f – block elements (sometimes called inner transition elements) are the elements in which the last electron enters the _____ orbitals.

A. nf

B. $(n - 1)f$

C. $(n - 2)f$

D. $(n - 3)f$

Answer: C

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70. General valence shell electronic configuration of f – block elements is

A. $(n - 2)f^{1-14}(n - 1)^{1-10}ns^2$

B. $(n - 2)^{0-14}(n - 1)^{0-10}ns^{0-2}$

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

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

Answer: D



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71. In all there are _____ f -block elements in the periodic table.

A. 14

B. 28

C. 32

D. 19

Answer: B



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72. The lanthanoids and actinoids are sometimes called f -block transition elements because they have incompletely filled _____ f -subshells.

A. penultimate

B. ultimate

C. inner

D. antepenultimate

Answer: D



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73. The chemistry of the early actinoids is more complicated than the corresponding lanthanoids

A. because they are radioactive

B. because they are highly reactive

C. due to the large number of oxidation states possible for these actinoid elements.

D. both(1)and(3)

Answer: C

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74. In any atoms, the outermost electrons are those that have the highest value of the

- A. principal quantum number
- B. azimuthal quantum number
- C. magnetic quantum number
- D. spin quantum number

Answer: A

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75. The elements $Z = 117$ and 120 have not yet been discovered. In which family/group would you place these elements?

- A. alkaline earth metals, halogens
- B. halogens, alkaline earth metals
- C. alkali metals, halogens
- D. halogens, alkali metals

Answer: B

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76. Which of the following is the best criterion of a metal?

- A. Lustrous surface
- B. High density
- C. High thermal conductivity

D. High three-dimensional electrical conductivity

Answer: D

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77. Which of the following is the best electrical conducting metals?

A. Plotonium

B. Copper

C. Silver

D. Aluminium

Answer: C

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78. Which of the following is correct?

- A. The conductivity of metals increases with increasing temperature, whereas that of nonmetals decreases.
- B. The conductivity of metals decreases with increasing temperature, whereas that of nonmetals increases.
- C. The conductivity of both metals and nonmetals increases with the increases of temperature.
- D. The conductivity of both metals and nonmetals decreases with the increases of temperature.

Answer: B



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79. Which of the following is widely used in the manufacture of electronic chips?

- A. Silicon
- B. Selenium
- C. Scandium
- D. Stronium

Answer: A

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80. Which of the following metals have low melting points?

- (i) Cesium (ii) Francium
- (iii) Gallium (iv) Rubidium

A. (i), (iii)

B. (i), (ii)

C. (i), (ii), (iii), (iv)

D. (iii), (iv)

Answer: C



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81. Which block of elements consists of metals, non metals and metalloids ?

A. *f*-block

B. *s*-block

C. *d*-block

D. *p*-block

Answer: D



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82. Nonmetals lie on the _____ of the periodic table.

- A. top right-hand side
- B. top left-hand side
- C. bottom right-hand side
- D. bottom left-hand side

Answer: A



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83. Which of the metals are usually referred to as lighter metals?

- A. *f*-block metals
- B. *d*-block metals

C. p -block metals

D. s -block metals

Answer: D

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84. Metals are separated from nonmetals by a diagonal band of semimetals running from top left to bottom right of the _____ in the table.

A. s -block

B. p -block

C. d – block

D. f -block

Answer: B

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85. Which of the following metals form amphoteric oxides?

A. *Be*, *Al*, *Ga*, *Sn*, and *Pb*

B. *Al*, *Ga*, *Sn*, and *Pb*

C. *Sn* and *Pb*

D. *Al* and *Ga*

Answer: A

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86. Both metals and nonmetals behave similarly towards

A. water

B. dilute acids

C. oxidizing acids

D. oxygen

Answer: C

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87. Which of the following is not the characteristic feature of metals?

A. Close-packed structure

B. Low coordination number

C. Metallic bonding

D. Give alloys with metals

Answer: B

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88. Which of the following is not the characteristic feature of nonmetals?

- A. Form molecular and covalent solids
- B. Posses low corredination number
- C. Form covalent acidic or neutral oxides
- D. Form only covalent compounds

Answer: D



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89. Arrange the following elements in the increasing order of metallic character:

Si, Be, Mg, Na, P.

A. $Na > Mg > Be > Si > P$

B. $P > Si > Be > Mg > Na$

C. $P < Si < Be < Mg < Na$

D. $Na < Mg < Be < Si < P$

Answer: C

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90. The electron density in an atom extends far beyond the nucleus.

In practice, we normally think of atomic size as the volume containing about ___ percent of the total electron density around the nucleus.

A. 100

B. 80

C. 70

D. 90

Answer: D



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91. For all practical purposes, the size of an individual atom cannot be uniquely defined. An indirect approach is required. The size of an atom is determined by its immediate environment, especially its interaction with surrounding atoms. Pertaining to the types of bonding how many types of atomic radii are employed?

A. Two

B. Four

C. Five

D. Three

Answer: B

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92. The internuclear distance between any two carbon atoms in diamond is 154 p m , so the covalent radius of carbon (r_c) is equal to

A. 154 p m

B. 308 p m

C. 32 p m

D. 77 p m

Answer: D

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93. The covalent radius (r_{cov}) is defined as the half-distance between the nuclei of two atoms of the same element joined in a _____ covalent bond

A. multiple

B. double

C. single

D. triple

Answer: C



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94. There is no real boundary to an atom because the electrons can be defined only in terms of _____.

A. orbitals

B. orbits

C. shells

D. subshells

Answer: A



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95. The van der Waals radius (r_{vdw}) is defined as the half-distance between the nuclei of two atoms of neighboring molecules in the ___ state.

A. gaseous

B. liquid

C. plasme

D. solid

Answer: D

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96. The concept of van der Waals radius is confined to

- A. noble gases
- B. representative nonmetals
- C. transition nonmetals
- D. inner transition nonmentals

Answer: B

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97. Metallic radius is usually not defined for ___ elements.

A. f -block

B. d – block

C. s – block

D. p -block

Answer: D



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98. Atomic radii can be measured by

A. X -ray diffraction

B. spectroscopic methods

C. both (1) and (2)

D. photoelectric effect

Answer: B



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99. Which of the following radius is not described for the element chlorine?

- A. Covalent radius
- B. van der Waals radius
- C. Metallic radius
- D. Ionic radius

Answer: C



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100. The magnitude of the _____ does not depend upon the packing of the particles when the substance is in the solid state.

A. covalent radius

B. van der Waals radius

C. metallic radius

D. ionic radius

Answer: A



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101. The internuclear distance between adjacent chlorine atoms of the two neighboring molecules in the solid state is 360 pm. Thus, the van der Waals radius of chlorine atom is_____.

A. 18\AA

B. 1.80\AA

C. 180\AA

D. 0.18\AA

Answer: B

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102. Which of the noble gases can be described in terms of either covalent radii or van der Waals radii?

(i) *Xe* (ii) *Ar*

(iii) *Kr* (iv) *Ne*

A. (i), (iii)

B. (i), (ii)

C. (iii), (iv)

D. (ii), (iii)

Answer: A



103. Which of the following statements is not correct?

- A. A metal crystal lattice consists of positive kernels (metal ions left after the removal of valence electrons) arranged in a definite pattern in a sea of mobile electrons.
- B. Each kernel (metal ion) is simultaneously attracted by a number of mobile electrons and each mobile electron is attracted by a number of metal ions.
- C. van der Waals radius of an element is always shorter than its covalent radius.
- D. A metallic radius is always longer than its covalent radius.

Answer: C

104. Which of the following radius is the largest?

A. Ionic radius

B. van der Waals radius

C. Metallic radius

D. Covalent radius

Answer: B

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105. Which of the following has the smallest atomic radius?

A. *C*

B. *N*

C. *O*

D. F

Answer: D

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106. Which of the following pairs of elements have similar atomic radii?

A. P, S

B. As, Se

C. N, O

D. Sb, Te

Answer: C

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

A. *Mg*

B. *Ca*

C. *Sr*

D. *Ba*

Answer: D



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108. Which of the following statements is not correct?

A. The ionic radii can be estimated by measuring the distances between cations and anions crystals.

B. A positive ion is always smaller than the corresponding atom.

C. Isoelectronic ions have identical sizes.

D. A negative ion is always bigger than corresponding atom.

Answer: C

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109. Which of the following has the smallest ionic radius?



Answer: A

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110. Sizes of the second and third row transition elements are almost the same because of

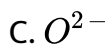
- A. *d*-orbital contraction
- B. lanthanide contraction
- C. actinide contraction
- D. both (2) and (3)

Answer: B

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111. which of the following has largest radius ?

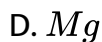
- A. Na^+
- B. F^-



Answer: C

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112. Which of the following species will have the largest size?



Answer: D

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113. Which of the following is not correct?

- A. Ionic radius does not affect the physical and chemical properties of an ionic compound.
- B. For ions derived from elements in different groups, the comparison in size is meaningful only if the ions are isoelectronic.
- C. Among isoelectronic cations, the size decreases as the charge on cation increases.
- D. Among isoelectronic anions, the size increases as the charge on anion increases.

Answer: A



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

A. *C*

B. *P*

C. *Si*

D. *N*

Answer: C

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115. For the transition elements, the variations in atomic radii are not so regular because electrons are being added to the _____ subshell.

A. $(n + 1)d$

B. $(n - 1)d$

C. nd

D. $(n + 2)d$

Answer: B

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116. While dealing with multielectron atoms or ions, we must use the concept of effective nuclear charged, Z_{eff} which is calculated by the formula

A. $Z_{eff} = Z + \sigma$

B. $Z_{eff} = Z / \sigma$

C. $Z_{eff} = Z - \sigma$

D. $Z_{eff} = Z\sigma^2$

Answer: C



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117. In *SI* system, the ionization enthalpy is measured in

- A. mega joules per mole
- B. kilo joules per mole
- C. electron volts per mole
- D. ergs per mole

Answer: B



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118. Ionization enthalpies are

- A. all positive quantities
- B. all negative quantities

C. either positive or negative quantities

D. all natural quantities

Answer: A

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119. The first ionization enthalpies generally increase from left to right across the periodic table because of

A. increase of atomic size

B. increase of nuclear charge

C. increase of number of shielding electrons

D. increase of effective nuclear charge

Answer: D

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120. The largest ionization enthalpies in any period occur for the

- A. alkali metals
- B. halogens
- C. noble gas elements
- D. alkaline earth metals

Answer: C



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121. The values of ionization enthalpies tend to increase within each period, except for small drops in ionization enthalpy at group ___ and ___ elements

- A. 14, 17

B. 13, 16

C. 16, 18

D. 13, 15

Answer: B



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122. Ionization enthalpies tend to decrease going down any column of main group elements because _____ going down the column.

A. nuclear charge increases

B. number of shielding electrons increases

C. atomic size increases

D. effective nuclear charge increases

Answer: C



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123. Ionization is not limited to the removal of a single electron from an atom. Two, three, or even more electrons can be removed sequentially from an atom, and the amount of energy associated with each step can be measured. Successively, larger amount of energy is required for each successive ionization step because

- A. it is much harder to remove a negatively charged electron from a positively charged ion than from a neutral atom.
- B. the nuclear charge increases after the removal of an electron.
- C. atoms are smaller than cations.
- D. none of these.

Answer: A



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124. Which of the following elements has a large jump between its fourth and fifth ionization enthalpies?

A. *Na*

B. *Mg*

C. *Al*

D. *Si*

Answer: D

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125. Arrange the following elements in the order of increasing first ionization enthalpy: *Na*, *Mg*, *Al*, and *Si*

A. $Na < Mg < Al < Si$

B. $Na < Mg < Si < Al$

C. $Na < Al < Mg < Si$

D. $Na > Mg > Al > Si$

Answer: C

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126. The first four ionization enthalpies of an element are $578kJmol^{-1}$, $1817kJmol^{-1}$, $2745kJmol^{-1}$, and $11575kJmol^{-1}$.

The element is

A. Na

B. Si

C. Mg

D. Al

Answer: D

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127. Electron gain enthalpy of an element is a measure of its atom's ability to accept an electron to form an anion. It is defined as the energy change (i.e., energy released or absorbed) when an electron is accepted by an isolated atom in the gaseous state in the _____ of the free atom.

- A. ground state
- B. first excited state
- C. second excited state
- D. third excited state

Answer: A

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128. Which of the following is a measure of the firmness or strength with which an extra electron is bound to the free atom?

- A. First ionization enthalpy
- B. Second ionization enthalpy
- C. Third ionization enthalpy
- D. Zeroth ionization enthalpy

Answer: D

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129. Electron gain enthalpy is greater than zero for

- A. *Na*
- B. *Mg*

C. A_1

D. S_n

Answer: B

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130. Which of the following elements have the most negative electron gain enthalpies corresponding to the largest release of energy?

A. Group 2 elements

B. Group 16 elements

C. Group 17 elements

D. Group 18 elements

Answer: C

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131. The general horizontal trend is that electron gain enthalpies become more negative (more energy is released as an extra electron is added) from group *1A* through group *VIIA* for a given period. Exceptions occur at the _____ and _____ elements.

- A. *IIA* and *VA*
- B. *IIA* and *VIA*
- C. *IIIA* and *VA*
- D. *IIA* and *IVA*

Answer: A

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132. Electron gain enthalpies of free anions are always

- A. zero
- B. negative
- C. positive
- D. nonzero

Answer: C



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133. Which of the following elements has the most negative electron gain enthalpy?

- A. *K*
- B. *Cl*
- C. *Br*
- D. *Cs*

Answer: B

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134. Which of these elements has a less favorable (more positive) $\Delta_{eg}H$?

A. *B*

B. *C*

C. *N*

D. *O*

Answer: C

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135. Which of the noble gases has the maximum positive $\Delta_{eg}H$?

A. *He*

B. *Ne*

C. *Ar*

D. *Kr*

Answer: B



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136. Which of the halogens has the largest negative $\Delta_{eg}H$?

A. *I*

B. *Br*

C. *Cl*

D. *F*

Answer: C



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137. Which of the group 16 elements has the least negative $\Delta_{eg}H$?

A. *O*

B. *S*

C. *Se*

D. *Te*

Answer: A



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138. Which of the following elements has positive $\Delta_{eg}H$?

(i) *Mn* (ii) *Zn*

(iii) *Cd* (iv) *Hg*

A. (i), (ii)

B. (i), (ii), (iii)

C. (i), (ii), (iii), (iv)

D. (ii), (iii), (iv)

Answer: C



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139. Which of the following elements has negative $\Delta_{eg}H$?

A. *N*

B. Alkaline earth metal

C. Noble gas

D. *P*

Answer: B



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140. Which of the following numerical scales of electronegativity (EN) uses the concept of bond energies?

- A. Pauling scale
- B. Mulliken-Jaffe scale
- C. Allred-Rochow scale
- D. Senderson scale

Answer: A



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141. Linus Pauling, an American scientist, assigned arbitrarily a value of _____ to fluorine.

A. 3.5

B. 3.0

C. 4.0

D. 2.8

Answer: C



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142. Which of the following elements is the least electronegative?

A. *S*

B. *Cl*

C. *Br*

D. *Se*

Answer: D



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143. Which of the following elements do not follow the general trends?

(i) *s*-block elements (ii) *p* – block elements

(iii) *f*-block (iv) *d* – block elements

A. (i), (ii)

B. (ii), (iii)

C. (iii)

D. (i), (iii), (iv)

Answer: C



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144. Although the electronegativity scale is somewhat arbitrary we can use it with reasonable confidence to make predictions about

- A. chemical bonding
- B. ionization enthalpy
- C. electron gain enthalpy
- D. none of these.

Answer: A

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145. Which of the following compounds contains ionic bonds?

- A. $SiCl_4$
- B. $CsBr$

C. $FeBr_3$

D. CH_4

Answer: B

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146. Which of the following is the most metallic element in the periodic table?

A. Fr

B. Ba

C. Ra

D. Cs

Answer: D

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147. Which of the elements exhibit only one valency in the combined state?

- A. *s*-block elements
- B. *p* – block elements
- C. *d* – block elements
- D. *f* – block elements

Answer: A



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148. For *p*-block elements, the normal valence (or group valence is equal to the number of valence electrons only for _____ elements

- (i) group 17 (ii) group 15
- (iii) group 14 (iv) group 13

A. (i), (ii), (iii), (iv)

B. (i), (ii), (iii)

C. (ii), (iii), (iv)

D. (iii), (iv)

Answer: D



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149. The oxidation number of oxygen in H_2O_2 is

A. -2

B. -1

C. $-1/2$

D. $+1$

Answer: B



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150. Which of the following halogens exhibits only -1 oxidation number in its compounds?

A. *F*

B. *Cl*

C. *Br*

D. *I*

Answer: A



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151. Which of the following elements cannot form strong $p_{\pi} - p_{\pi}$ multiple bonds?

A. C

B. N

C. P

D. O

Answer: C



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152. Which of the following hydrides have unusually high boiling points on account of intermolecular hydrogen bonding?

A. NH_3

B. H_2O

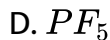
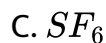
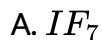
C. HF

D. All of these

Answer: D

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153. Which of the following species does not exist?



Answer: B

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154. Element Be shown diagonal relationship with

A. Mg

B. Si

C. Al

D. B

Answer: C



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155. Which of the following oxides are amphoteric in nature?

A. BeO

B. Ga_2O_3

C. Bi_2O_3

D. All of these

Answer: D



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Follow Up Test 2

1. To classify elements *A. E. B.* de chancourtois arranged the then known elements in the order of increasing atomic weights and made a _____ table of elements to display the periodic occurrence of properties.

- A. cylindrical
- B. circular
- C. cubical
- D. rectangular

Answer: A



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1. Name the scientist who believed that there existed some mystical connection between music and chemistry.

A. de Chancourtois

B. *J. W.* Dobereiner

C. John Newlands

D. *S.* Cannizzaro

Answer: C



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1. The periodic law, as we know it today, owes its development to two chemists.

(i) John Newlands (ii) Dmitri *I.* Menseleev

(iii) *J.*Lothar Meyer (iv) *J. W.* Dobereiner

A. (*i*), (*ii*)

B. (*ii*), (*iv*)

C. (*ii*), (*iii*)

D. (*i*), (*iv*)

Answer: C



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Follow Up Test 5

1. The first real breakthrough in the classification of elements was provided by_____

A. Dmitri Ivanovich Mendeleev

B. Joham Dobereiner

C. Lothar Meyer

D. John Aiexander Newlands

Answer: A

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Follow Up Test 6

1. When Mendeleev developed his periodic table, chemists knew nothing about the internal structure of atom. His classification was

based on their atomic weights. Several anomalies persisted in the table with regard to the correct order of atomic weights of

(i) K and Ar (ii) Co and Ni

(iii) Te and I

A. (i), (ii)

B. (i), (ii), (iii)

C. (ii), (iii)

D. (i), (iii)

Answer: B



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Follow Up Test 7

1. The element yttrium, $Y(Z = 39)$, belongs to the _____ period of the periodic table.

A. fourth

B. fifth

C. sixth

D. third

Answer: B

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Follow Up Test 8

1. In the short form of the periodic table, elements are arranged in blocks on the kinds of _____ being filled.

A. orbits

B. shells

C. atomic orbitals

D. periods

Answer: C



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Follow Up Test 9

1. Which of the following metals has the highest thermal conductivity?

A. Copper

B. Silver

C. Maganese

D. Gold

Answer: B



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Follow Up Test 10

1. Finding the size of an atom is a lot more complicated than measuring the radius of a ball because (i) the size of an atom is very small

(ii) the electron cloud surrounding the nucleus does not have a sharp boundary.

(iii) we cannot isolate a single and measure its diameter the way we can measure the diameter of a ball

(iv) atomic radius changes as atom moves from one environment to

the other and also when the atom is present in different bonded states.

A. (i), (ii)

B. (ii), (iii)

C. (i), (ii), (iii), (iv)

D. (ii), (iii), (iv)

Answer: C



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Follow Up Test 11

1. The first ionization enthalpy of an atom is the minimum energy needed to remove the highest energy (that is the outermost)

electron from the neutral atom in the _____state in its ground state.

- A. solid
- B. liquid
- C. gaseous
- D. colloidal

Answer: C



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Follow Up Test 12

1. Energy is _____when an electron is added to isolated gaseous atom to form an ion with a $1 -$ charge.

- A. released

- B. absorbed
- C. nither released nor absorbed
- D. either released or absorbed

Answer: D

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Follow Up Test 13

1. A qualitative measure of the ability of an atom in___ to attract shared electrons to itself is called electronegativity.

- A. an ionic compound
- B. a covalent compound
- C. gaseous state
- D. condensed state

Answer: B

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Follow Up Test 14

1. Which of the following is incorrect?

- A. Metals are electropositive elements.
- B. Metals usually have low ionization enthalpies.
- C. As we move down a group, the metallic character of the element decreases.
- D. Nonmetals are electronegative elements.

Answer: C

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1. The set representing the correct order of the first ionisation potential is

A. $K > Na > Li$

B. $Ge > Si > C$

C. $Be > Mg > Ca$

D. $B > C > N$

Answer: C



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1. In which one of the following pairs is the radius of the second species greater than that of the first?

A. Na , Mg

B. Ba^{2+} , Sr^{2+}

C. O^{2-} , N^{3-}

D. Li^+ , Be^{2+}

Answer: C

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Level

1. Which of the following element has the highest ionisation energy ?

A. nitrogen

B. oxygen

C. carbon

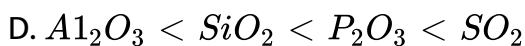
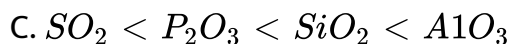
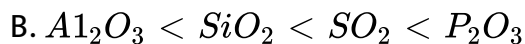
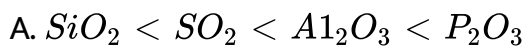
D. boron

Answer: A



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2. Among Al_2O_3 , SiO_2 , P_2O_3 and SO_2 the correct order of acid strength is



Answer: D

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3. Which of the following element is most electropositive?

A. *S*

B. *Al*

C. *Mg*

D. *P*

Answer: C

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4. *Eka*-aluminium and *eka*-silicon are known as

A. neutron and magnesium

B. proton sulphur

C. iron and sulphur

D. gallium and germanium

Answer: D



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5. Which one of the following is the smallest in size?

A. F^-

B. O^{2-}

C. N^{3-}

D. Na^+

Answer: D



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6. Each group of the modern periodic table consists of a number of elements having the similar electronic configuration of the ___ shell.

- A. penultimate
- B. valence
- C. outermost
- D. antepenultimate

Answer: B



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7. An element X belongs to the fourth period and the fifteenth group of the periodic table. Which one of the following is true

regarding the outer electronic configuration of X ? It has

- A. half-filled d -orbitals and half-filled p -orbitals
- B. completely filled s , p , and d -orbitals
- C. completely filled s -and p -orbitals
- D. completely filled s -orbitals and partially filled p -orbitals

Answer:

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8. Which of the following two elements in the periodic table are expected to combine in the most violent fashion?

- A. C and F
- B. P and O
- C. Mg and N

D. Cl and F

Answer: A

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9. The correct order in which the first ionization enthalpy increases is

A. Be, Na, K

B. Na, K, Be

C. K, Na, Be

D. K, Be, Na

Answer: C

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10. The least stable in amongst the following is :

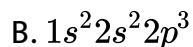
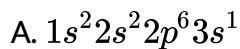


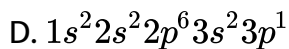
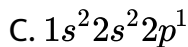
Answer: D



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11. The electronic configuration of the atom having maximum difference in first and second ionization enthalpies is



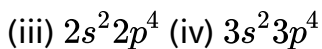
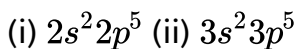


Answer: A

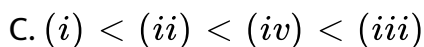
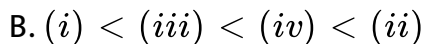
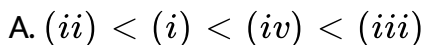
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12. The electronic configurations of four elements are given below.

Arrange these elements in the correct order of the magnitude (without sign) of their electron affinity



Select the correct answer using the codes given below:

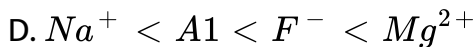
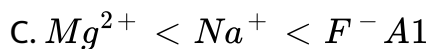
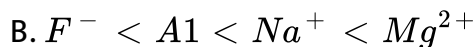
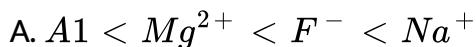


D. $(iii) < (iv) < (i) < (ii)$

Answer: D

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



Answer: C

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14. The successive ionization energy values for an element X are given below:

(i) 1st ionization energy = 410kJmol^{-1}

(ii) 2nd ionization energy = 820kJmol^{-1}

(iii) 3rd ionization energy = 1100kJmol^{-1}

(iv) 4th ionization energy = 1500kJmol^{-1}

(v) 5th ionization energy = 3200kJmol^{-1}

Find out the number of valence electrons for the atom X .

A. (v)

B. (iii)

C. (ii)

D. (iv)

Answer:

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15. In which of the following arrangements, the order is according to the property indicated against it?

A. $Li < Na < K < Rb$ (metallic radius)

B. $B < C < N < O$ (ionization enthalpy)

C. $I < Br < F < Cl$ (electron gain enthalpy)

D. $Al^{3+} < Mg^{2+} < Na^+ < F^-$ (ionic radius)

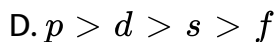
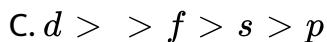
Answer: B

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16. In a given shell, the order of screening effect is

A. $s > p > d > f$

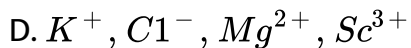
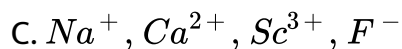
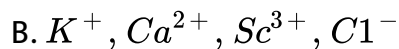
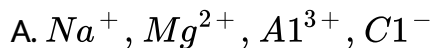
B. $f > p > s > d$



Answer: A

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17. Which one of the following sets of ions represents the collection of isoelectronic species?



Answer: B

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18. Consider the following statements:

(i) The radius of an atom is larger than that of the parent atom.

(ii) The ionization energy generally increase with increasing atomic number in a period.

(iii) The electronegativity of an element is the tendency of an isolated atom to attract an electron.

Which of the above statements is//are correct?

A. (i), (ii), (iii)

B. (ii) and (iii)

C. (i) and (ii)

D. (i) alone

Answer: C



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19. The first ionisation potential of Na is $5.1eV$. The value of electrons gain enthalpy of Na^+ will be

A. $-2.55eV$

B. $-5.1eV$

C. $+2.55eV$

D. $-10.2eV$

Answer: B

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20. Which of the following represents the correct order of increasing first ionisation enthalpy for Ca , Ba , Se , and Ar ?

A. $ba < Ca < Se < S < Ar$

B. $Ca < S < Ba < Se < Ar$

C. $Ca < Ba < S < Se < Ar$

D. $S < Se < Ca < Ba < Ar$

Answer: A

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21. The increasing order of the first ionisation enthalpies of the elements B , P , S and F (lowest first) is:

A. $B < P < S < F$

B. $P < S < B < F$

C. $F < S < P < B$

D. $B < S < P < F$

Answer: D

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22. The following statements regarding the periodic trends of chemical reactivity of the alkali metals and the halogens are given.

Which of these statement gives the correct picture:

A. The chemical reactivity decreases in alkali metals but increases in halogens with increase in atomic number

B. In alkali metals, the reactivity increases but in halogens it decreases with increase in atomic number down the group.

C. In both alkali metals and halogens, the chemical reactivity decreases with increase in atomic number down the group.

D. The chemical reactivity increases with increase in atomic number down the group in both alkali metals and halogens.

Answer: B



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23. Which of the following statements is not correct for the periodic classification of elements?

- A. For transition elements, the d subshells are filled with electrons monotonically with the increase in atomic number.
- B. The first ionization energies of elements along a period do not vary in a regular manner with the increase in atomic number.
- C. Nonmetallic elements are lesser in number than metallic elements.
- D. The properties of element are the periodic functions of their atomic numbers.

Answer: A

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24. One mole of magnesium in the vapor state absorbed 1200kJmol^{-1} of energy. If the first and second ionization energies of Mg are 750 and 1450kJmol^{-1} , respectively, the final composition of the mixture is

A. $13\% Mg^+ + 87\% Mg^{2+}$

B. $14\% Mg^+ + 86\% Mg^{2+}$

C. $69\% Mg^+ + 31\% Mg^{2+}$

D. $31\% Mg^+ + 69\% Mg^{2+}$

Answer: C



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25. In any period, the valency of an element with respect to oxygen

A. charges randomly

B. increases one by one from IA to VIIA

C. decreases one by one from IA to VIIA

D. increases one by one from IA to IVA and then decreases one by one from IVA to VIIA

Answer: B

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26. Which of the following is correctly matched?

A. C – C bond length – 0.176 nm

B. Ionic radius of Na^+ – 0.136 nm

C. Ionic radius of F^- – 0.095 nm

D. C – C bond length – 0.077 nm

Answer: A



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Level II

1. The first ionization energy of oxygen is less than that of nitrogen.

Which of the following is the correct reason for this observation?

- A. Higher electronegativity of oxygen than nitrogen
- B. Greater effective nuclear charge of oxygen than nitrogen
- C. Lesser atomic size of oxygen than nitrogen
- D. Greater inter electron repulsion between two electrons in the same p -orbital counter balances the increase in effective nuclear charge on moving from nitrogen to oxygen

Answer: D



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Level Iii

1. The electronegativity of the following elements increases in the order

A. *P, Si, N, C*

B. *Si, P, C, N*

C. *C, N, Si, P*

D. *N, Si, C, P*

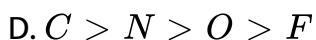
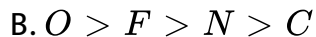
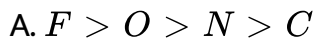
Answer: B



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Level Iv

1. The correct order of the second ionisation potential of carbon, nitrogen, oxygen and fluorine is



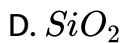
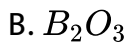
Answer: B

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Archives

1. Which of the following oxides is not expected to react with sodium hydroxide ?

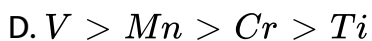
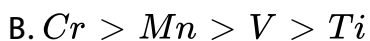
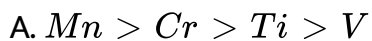




Answer: C

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2. The correct of decreasing second ionisation enthalpy of $Ti(22)$, $V(23)$, $Cr(24)$ and $Mn(25)$ is



Answer: B



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3. Increase in atomic size down the group is due to increase in

- A. the number of electrons
- B. the number of protons and neutrons
- C. the number of neutrons
- D. the number of protons, neutrons, and electrons

Answer: A



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4. Which of the following has the lowest ionization enthalpy?

- A. Oxygen
- B. Nitrogen

C. Fluorine

D. Sulphur

Answer: D

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5. Which of the following is the second most electronegative element?

A. Chlorine

B. Oxygen

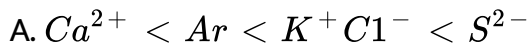
C. Sulphur

D. Fluorine

Answer: B

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6. The correct order of the size is

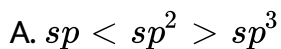


Answer: C



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7. The correct order of electronegativity regarding the hybrid orbitals of carbon is :



C. $sp > sp^2 > sp^3$

D. $sp > sp^2 < sp^3$

Answer: C

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8. Which one of the following arrangements represents the correct order of electron gain enthalpy of the given atomic species?

A. $F < C1 < O < S$

B. $S < O < C1 < F$

C. $O < S < F < C1$

D. $C1 < F < S < O$

Answer: C

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9. Four successive members of the first row transition elements are listed below with their atomic number. Which one of them is expected to have the highest third ionisation enthalpy?

A. Vanadium ($Z = 23$)

B. Chromium ($Z = 24$)

C. Iron ($Z = 26$)

D. Manganese ($Z = 25$)

Answer: D

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10. Which of the following is an inert gas?

A. H_2

B. O_2

C. N_2

D. Ar

Answer: D



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11. Identify the correct order in which the covalent radius of the following elements increases ?

(i) Ti (ii) Ca

(iii) Sc

A. (i), (ii), (iii)

B. (iii), (ii), (i)

C. (ii), (i), (iii)

D. (i), (iii), (ii)

Answer: D

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12. Match list I with list II and select the correct answer with the code given below

List I			List II
(Successive ionization energies / $KJmol^{-1}$)			(Elements)
IE_1	IE_2	IE_3	
(i) 2080	3963	6130	(a) H
(ii) 520	7297	11810	(b) Li
(iii) 900	1758	14810	(c) Be
(iv) 800	2428	3660	(d) B
			(e) Ne

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13. Which of the following elements is not an actinide?

A. Curium

B. Californium

C. Uranium

D. Terbium

Answer: D



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14. *Ha* is an alphabetical symbol for

A. halnium

B. hassnium

C. hahnium

D. helium

Answer: C



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15. For the electron affinity of halogens (with $-ve$ sign), which of the following is correct?

A. $Br > F$

B. $F > Cl$

C. $Br > Cl$

D. $F > I$

Answer: D

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16. Ionic radii are

A. inversely proportional to the effective nuclear charge

B. inversely proportional to the square of effective nuclear

C. directly proportional to the effective nuclear charge

D. directly proportional to the square of effective nuclear charge

Answer: A

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17. Which of the following has no unit?

A. Electronegativity

B. Electron affinity

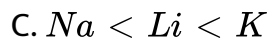
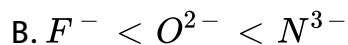
C. Ionization energy

D. Excitation potential

Answer: A

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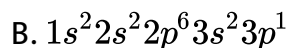
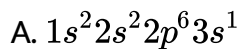
18. The correct order of radii is



Answer: B

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19. A sudden large jump between the values of second and third ionisation energies of an element would be associated with the electronic configuration



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

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

Answer: D



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20. The number of element present in the fifth period is

A. 18

B. 32

C. 8

D. 24

Answer: A



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21. The electron affinity values (in kJmol^{-1}) of three halogens, x , y , and z are, respectively, -349 , -333 , and -325 . Then x , y , and z are, respectively,

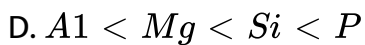
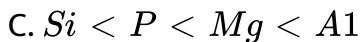
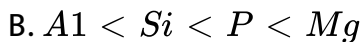
- A. F_2 , Cl_2 , and Br_2
- B. Cl_2 , F_2 , and Br_2
- C. Cl_2 , Br_2 , and F_2
- D. Br_2 , Cl_2 , and F_2

Answer: B

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22. Arrange the following in the order of increasing ionization potential

- A. $Mg < Al < Si < P$



Answer: D

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23. The ions O^{2-} , F^{-} , Na^{+} , Mg^{2+} , and Al^{3+} are isoelectronic.

Their ionic radii show

A. a decrease from O^{2-} to F^{-} and then increase from Na^{+} to



B. a significant increase from O^{2-} to Al^{3+}

C. a significant decrease from O^{2-} to Al^{3+}

D. an increase from O^{2-} to F^{-} and then decrease from Na^{+} to



Answer: C

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24. Which of the following is wrong ?

A. $NH_3 < PH_3 < AsH_3$ (acidic character)

B. $Li < Be < B < C$ (IE_1)

C. $Al_2O_3 < MgO < Na_2O < K_2O$ (basic)

D. $Li^{+} < Na^{+} < K^{+} < Cs^{+}$ (ionic radius)

Answer: B

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25. Which is true about the electronegative order of the following elements ?

A. $P > Si$

B. $C > N$

C. $Br > Cl$

D. $Sr > Ca$

Answer: A



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26. The element with atomic number 56 belongs to which block ?

A. s

B. p

C. d

D. f

Answer: A

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27. Which of the following order is correct for the first ionization potential of B , C , and N ?

A. $B > C > N$

B. $N > C > B$

C. $N > C < B$

D. $N < C < B$

Answer: B

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28. Electron affinity depends on

A. atomic size

B. nuclear charge

C. atomic number

D. atomic size and nuclear charge both

Answer: D



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

A. 11 and 20

B. 12 and 30

C. 13 and 31

D. 14and33

Answer: C



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30. Which of the following sets of atomic numbers belongs to that of alkali metals?

A. 1, 12, 30, 4, 62

B. 37, 19, 3, 55

C. 9, 17, 35, 53

D. 12, 20, 56, 88

Answer: B



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31. The decreasing order of the ionization potential of the following elements is

A. $Ne > Cl > P > S > Al > Mg$

B. $Ne > Cl > P > S > Mg > Al$

C. $Ne > Cl > S > P > Mg > Al$

D. $Ne > Cl > S > P > Al > Mg$

Answer: B

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32. Which of the following does not exhibit the periodicity in properties of the elements?

A. Ionization energy

B. n/p ratio

C. Electronegativity

D. Atomic radius

Answer: B



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33. Which one of the following is an incorrect statement?

- A. The ionization potential of nitrogen is greater than that of oxygen
- B. The electron affinity of fluorine is greater than that of chlorine.
- C. The ionization potential of beryllium is greater than that of boron.
- D. The electronegativity of fluorine is greater than that of chlorine.

Answer: B

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34. The electronic configuration of element A , B , and C are $[He]2s^1$, $[Ne]3s^1$, and $[Ar]4s^1$, respectively. Which one of the following order is correct for the IE_1 ($\text{in } kJ\text{mol}^{-1}$) 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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35. In the modern long form of the periodic table, the elements are arranged in the increasing order of

- A. atomic mass
- B. atomic number
- C. mass number
- D. isotopic number

Answer: B

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36. The element with the highest electron affinity among the halogens is

- A. F
- B. Cl

C. *Br*

D. *I*

Answer: B



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37. Ionization energy is the highest in

A. $[Ne]3s^1$

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

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

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

Answer: B



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