



# CHEMISTRY

## BOOKS - MTG CHEMISTRY (HINGLISH)

### PRACTICE PAPER 3

#### Practice Paper 3

1. Compressibility factor for  $H_2$  behaving as real gas is

A. 1

B.  $\left(1 - \frac{a}{RTV}\right)$

C.  $\left(1 + \frac{Pb}{RT}\right)$

D.  $\frac{RTV}{(1 - a)}$

**Answer: C**



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2. Which of the following statements is correct with respect to the property of elements with

increase in atomic number of in the carbon family (group 14)?

- A. Their metallic character decreases.
- B. The stability of +2 oxidation state increases.
- C. Their ionization energy increases
- D. Their atomic size decreases.

**Answer: B**



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3. A sample of calcium carbonate ( $CaCO_3$ ) has the following percentage composition:

$$Ca = 40\% , C = 12\% , O = 48\%$$

If the law of constant proportions is true, then the weight of calcium in 4g of a sample of calcium carbonate from another source will be

A. 0.016 g

B. 0.16 g

C. 1.6 g

D. 16 g

Answer: C



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4. For the reaction,

$CO_{(g)} + Cl_{2(g)} \rightleftharpoons CoCl_{2(g)}$ , the value of

$K_p / K_c$  is equal to

A. 1

B.  $RT$

C.  $\sqrt{RT}$

D.  $\frac{1}{RT}$

**Answer: D**



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5. Which of the following is not a basic physical quantity?

A. Length

B. Time

C. Density

D. Amount of substance

**Answer: C**



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**6.** In any subshell, the maximum number of electrons having same value of spin quantum number is

A.  $\sqrt{l(l+1)}$

B.  $l + 2$

C.  $2l + 1$

D.  $4l + 2$

**Answer: C**



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7. Clean water would have BOD value of less than

A. 17 ppm

B. 5 ppm

C. 200,000 ppm

D. 10 ppm



**Answer: B**



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**8.** Which of the followin will show least dipole character?

A. Water

B. Ethanol

C. Ethane

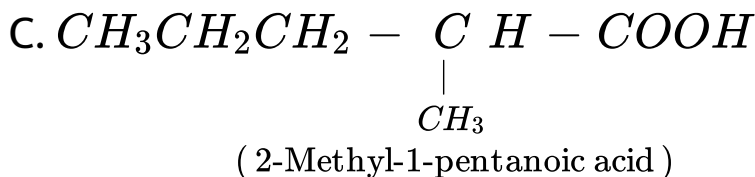
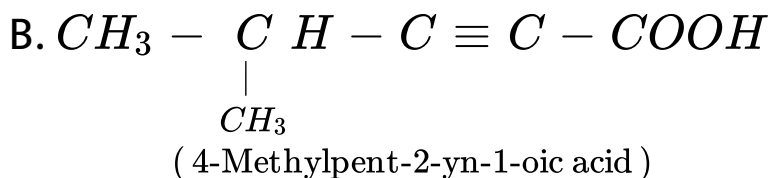
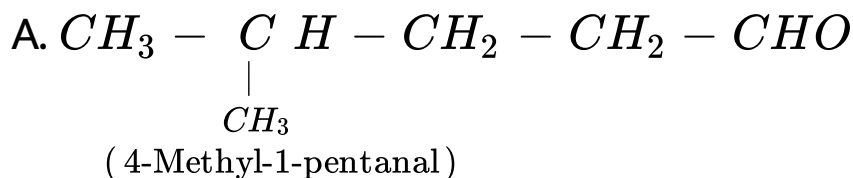
D. Ether

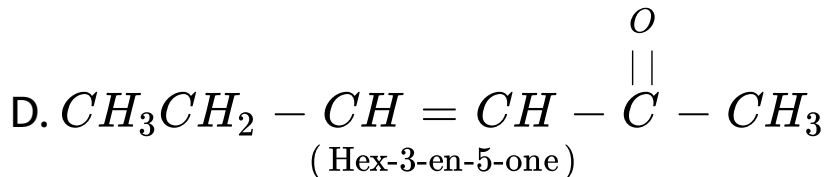
Answer: C



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9. Indicate the wrongly named compound.





**Answer: D**



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**10.** Heavy water is used as a

- A. fuel in engines
- B. semiconductor
- C. moderator in nuclear reactors
- D. insulator in steam engines.

**Answer: C**



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**11.** The pH of 0.05 M  $\text{Ba}(\text{OH})_2$  solution is

A. 12

B. 13

C. 1

D. 10

**Answer: B**

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12. Which of the following solutions will have pH close to 1.0?

A. 100 mL of M/10 HCl+100 mL of M/10 NaOH

B. 55 mL of M/10 HCl+45mL of M/10 NaOH

C. 10 mL of M/10 HCl+90mL of M/10 NaOH

D. 75 mL of M/10 HCl+25mL of M/10 NaOH

**Answer: D**

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13. The signs of  $\Delta H$ ,  $\Delta S$  and  $\Delta G$  for a non-spontaneous reaction at all temperature would

e

A. +, +, -

B. +, -, +

C. -, -, -

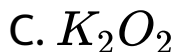
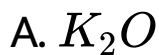
D. +, +, +

**Answer: B**



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14. Which oxide is formed when potassium is heated in excess of oxygen?



**Answer: D**

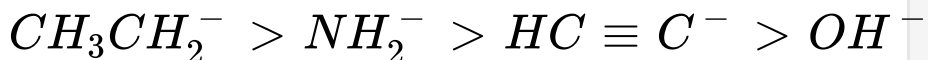


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15. What is the decreasing order of strength of the bases

$OH^-$ ,  $NH_2^-$ ,  $HC \equiv C^-$  and  $CH_3CH_2^-$ ?

A.



B.

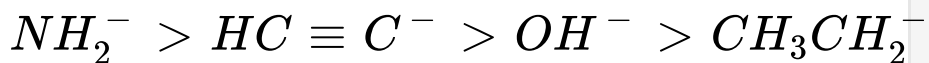


C.





D.



**Answer: A**



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**16.** The electrons, identified by quantum numbers  $n$  and  $l$  (i)  $n=4, l=1$  (ii)  $n=4, l=0$  (iii)  $n=3, l=2$  (iv)  $n=3, l=1$  can be placed in order of increasing energy from the lowest to highest as

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

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

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

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

**Answer: A**



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**17. Conjugate base of a strong acid is**

A. a weak base

B. a strong base

C. neutral

D. a weak acid.

**Answer: A**



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**18.** A sample of gas has a volume of  $V_1$  litre at temperature  $t_1.^\circ C$ . When the temperature of the gas is changed to  $t_2.^\circ C$  at constant pressure, then the volume of the gas was found

to increase by 10%. The percentage increase in temperature is

A. 0.1

B.  $\left(10 + \frac{2730}{t_1}\right) \%$

C. 20 %

D.  $(0.1 + t_1^{-1}) \%$

**Answer: B**



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19. The liquefaction behaviour of temporary gases approaches that of permanent gases as we go

A. below critical temperature

B. above critical temperature

C. above absolute zero

D. below absolute zero

**Answer: B**



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**20.** When the temperature is raised, viscosity of the liquid decreases. This is because

A. volume of the solution decreases

B. increase in temperature increases the average kinetic energy of the molecules which overcomes the attractive forces between them

C. covalent and hydrogen bond forces decrease

D. attraction between the molecule increases.

**Answer: B**



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**21.** the pH of a solution prepared by mixing 2M, 100 mL HCl and M, 200 mL NaOH at  $25^{\circ}C$  is

A. 8

B. 7

C. 4

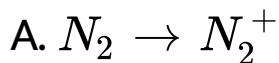
D. 5

**Answer: B**

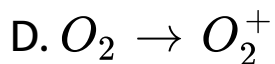
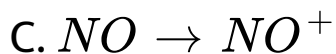
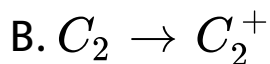


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**22.** In which of the following ionisation processes, the bond order has increased and the magnetic behaviour has changed?





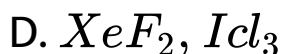
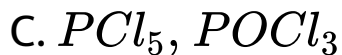
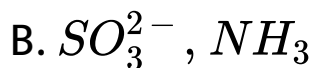
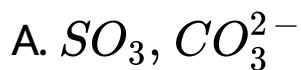


**Answer: C**



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**23.** In which of the following pairs, the hybridisation of central atoms is same, but geometry is not the same?



**Answer: D**



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**24.** Select correct statement for  $BrF_5$ .

A. All fluorine atoms are in same plane

B. Four fluorine atoms and Br atom is in same plane.

C. Four fluorine atoms are in same plane

D. It has all F-Br-F bond angles at  $90^\circ$ .

**Answer: C**



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25. Consider a  $P_y$  orbital of an atom and identify correct statement

A. s-orbital of another atom produces  $\pi$ -bond when y is the bond formation axis

B.  $p_y$ -orbital of another atom produces  $\sigma$ -bond when x is the bond formation axis.

C.  $p_z$ -orbital of another atom produces  $\pi$ -bond when x is the bond formation axis.

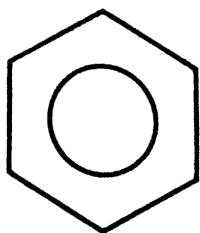
D.  $d_{xy}$ -orbital of another atom produces  $\pi$ -bond when x is the bond formation axis

**Answer: D**

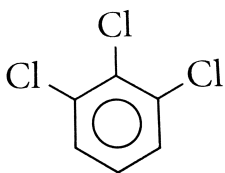


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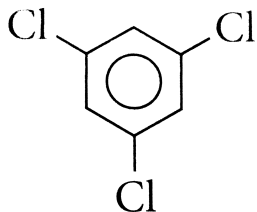
26. Which of the following will have maximum dipole moment?



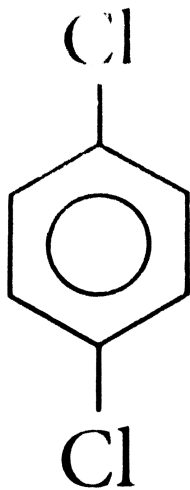
A.



B.



C.



D.

**Answer: B**



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27. Which of the following is not the consequence of H-bonding?

A. Glycerol is more soluble in water than ethanol.

B. Boiling point of  $C_2H_5OH$  is higher than  $CH_3 - O - CH_3$ .

C. p-nitrophenol has higher boiling point than o-nitrophenol

D. HCl is water soluble due to H-bonding

**Answer: D**



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28. The two equilibrium



are simultaneously maintained in a solution with equilibrium constant  $K_1$  and  $K_2$  respectively.

The ratio of  $[A^+]$  to  $[AB_2^-]$  in the solution is

A. directly proportional to the concentration of  $B^-$

B. inversely proportional to the concentration of  $B^-$

C. directly proportional to the square of the concentration of  $B^-$



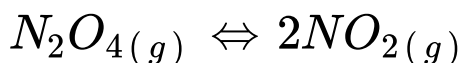
D. Inversely proportional to the square of the concentration of  $B^-$ .

**Answer: D**



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**29.** Consider the following equilibrium in a closed container,



At a fixed temperature, the volume of the reaction container is halved. For this change

which of the following statements holds true regarding the equilibrium constant ( $K_p$ ) and degree of dissociation ( $\alpha$ )?

- A. Neither  $K_p$  nor  $\alpha$  changes
- B. Both  $K_p$  and  $\alpha$  change
- C.  $K_p$  changes, but  $\alpha$  does not change
- D.  $K_p$  does not change, but  $\alpha$  changes

**Answer: D**



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30. The degree of dissociation  $\alpha$  of the reaction"



can be related to  $K_p$  as:

$$\text{A. } \alpha = \frac{\frac{K_p}{P}}{4 + \frac{K_p}{P}}$$

$$\text{B. } \alpha = \frac{K_p}{4 + K_p}$$

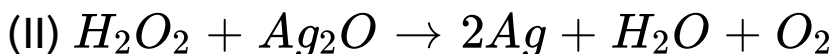
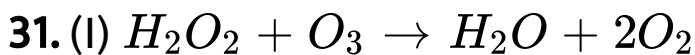
$$\text{C. } \alpha = \left[ \frac{K_p / P}{4 + K_p / P} \right]^{1/2}$$

$$\text{D. } \alpha = \left[ \frac{K_p}{4 + K_p} \right]^{1/2}$$

**Answer: C**



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Role of hydrogen peroxide in the above reactions is respectively

A. oxidising in (I) and reducing in (II)

B. reducing in (I) and oxidising in (II)

C. Reducing in (I) and (II)

D. oxidising in (I) and (II)

**Answer: C**

32. Which set of quantum numbers is possible for the last electron of  $Mg^+$  ion

A.  $n=3, l=2, m=0, s=+1/2$

B.  $n=2, l=3, m=0, s=+1/2$

C.  $n=1, l=0, m=0, s=+1/2$

D.  $n=3, l=0, m=0, s=+1/2$

**Answer: D**

**33.** Which of the following reactions is said to be entropy driven?

A. Endothermic reaction with positive entropy change and high temperature

B. Endothermic reaction with negative entropy change and low temperature

C. Exothermic reaction with positive entropy change and high temperature

D. Exothermic reaction with negative entropy change and low temperature

**Answer: A**

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**34.** If  $10^{21}$  molecules are removed from 200 mg of  $CO_2$ , the number of moles of  $CO_2$  left is

A.  $2.88 \times 10^{-3}$

B.  $28.8 \times 10^{-3}$

C.  $0.288 \times 10^{-3}$

D.  $1.66 \times 10^{-2}$

**Answer: A**



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**35.** The ions  $O^{2-}$ ,  $F^{-}$ ,  $Mg^{2+}$  and  $Al^{3+}$  are isoelectronic. Their ionic radii show

A. a decrease from  $O^{2-}$  to  $F^{-}$  and then increase from  $Na^{+}$  to  $Al^{3+}$



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  $Al^{3+}$

**Answer: C**



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**36.** The pH of 0.004 M hydrazine solution is 9.7.

its ionisation constant ( $K_b$ ) is

A.  $7.79 \times 10^{-8}$

B.  $4.49 \times 10^{-9}$

C.  $1.67 \times 10^{-10}$

D.  $6.25 \times 10^{-7}$

**Answer: D**



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**37.** The vapour density of a mixture containing  $NO_2$  and  $N_2O_4$  is 38.3 at 300 K. the number of

moles of  $NO_2$  in 100 g of the mixture is approximately

A. 0.44

B. 4.4

C. 33.4

D. 3.34

**Answer: A**



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38. An alkane  $C_7H_{16}$  is produced by the reaction of lithium di(3-pentyl)cuprate with ethyl bromide. The name of the product is

A. 3-methylhexane

B. 2-ethylpentane

C. 3-ethylpentane

D. n-heptane.

**Answer: C**



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39. The enthalpy of neutralisation of  $NH_4OH$  and  $CH_3COOH$  is  $-10.5 \text{ kcal mol}^{-1}$  and enthalpy of neutralisation of  $CH_3COOH$  with strong base is  $-12.5 \text{ kcal mol}^{-1}$ . The enthalpy of ionisation of  $NH_4OH$  will be

A.  $4.0 \text{ kcal mol}^{-1}$

B.  $3.0 \text{ kcal mol}^{-1}$

C.  $2.0 \text{ kcal mol}^{-1}$

D.  $3.2 \text{ kcal mol}^{-1}$

**Answer: C**



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40. When  $LiNO_3$  is heated, it gives oxide,  $Li_2O$  whereas other alkali metals nitrates decompose to give corresponding

- A. nitrite
- B. peroxide
- C. both nitrite and oxide
- D. none of these

**Answer: A**



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41. Which one of the following statements is not true?

A. pH of drinkingg water should be between

5.5-9.5

B. Concentration of DO below 6 ppm is good

from the growth of fish

C. Clean water would have a BOD value of

less than 5 ppm

D. Oxides of sulphur, nitrogen and carbon  
are the most widespread air pollutant

**Answer: B**



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**42.** The solubility product of  $MgF_2$  is  $7.4 \times 10^{-11}$ . Calculate the solubility of  $MgF_2$  in 0.1M NaF solution

A.  $7.4 \times 10^{-9}$



B.  $3.7 \times 10^{-9}$

C.  $3.7 \times 10^{-11}$

D.  $7.4 \times 10^{-11}$

**Answer: A**



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**43.** The aqueous solution of potash alum

$[K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O]$  is acidic due to

A. hydrolysis of  $K^+$

B. hydrolysis of  $Al^{3+}$

C. hydrolysis of  $SO_4^{2-}$

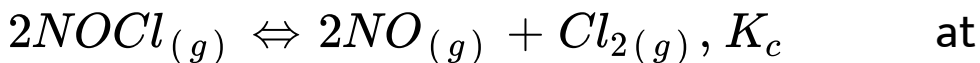
D. Presence of acid in its crystal as impurity.

**Answer: B**



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**44.** For reaction,



$427^\circ C$  is  $3 \times 10^{-6} L \text{ mol}^{-1}$ . The value of  $K_p$

is nearly,

A.  $7.50 \times 10^{-5}$

B.  $2.50 \times 10^{-5}$

C.  $2.50 \times 10^{-4}$

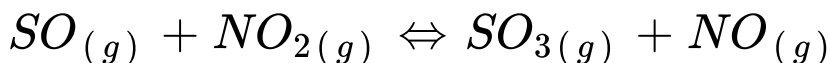
D.  $1.75 \times 10^{-4}$

**Answer: D**



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**45.** At a certain temperature, the equilibrium constant  $K_c$  is 1 for the reaction,



If 1.0 mol each of the four gases is taken in a one litre container the concentration of  $NO_2$  at equilibrium would be

A.  $1.6 \text{ mol L}^{-1}$

B.  $0.8 \text{ mol L}^{-1}$

C.  $0.4 \text{ mol L}^{-1}$

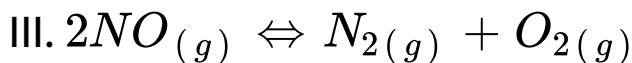
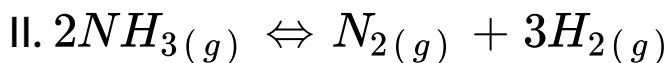
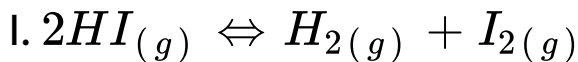
D.  $0.6 \text{ mol L}^{-1}$

**Answer: C**



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**46.** For which of the following reactions, the degree of dissociation cannot be calculated from the vapour density data.



A. I and III

B. III and IV

C. I and II

D. II and III

**Answer: A**



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