

**VITEEE Chemistry 2012**

1. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is



2. The reaction,

$2A(g) + B(g) \rightleftharpoons 3C(g) + D(g)$  is begun with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression

(a)  $[(0.75)^3 (0.25)] / [(1.00)^2 (0.75)]$

(b)  $[(0.75)^3 (0.25)] / [(0.50)^2 (0.75)]$

(c)  $[(0.75)^3 (0.25)] / [(0.50)^2 (0.25)]$

(d)  $[(0.75)^3 (0.25)] / [(0.75)^2 (0.25)]$

3. Which of the following expressions correctly represent the equivalent conductance at infinite dilution of  $Al_2(SO_4)_3$ ? Given that  $\lambda_{Al^{3+}}^{\infty}$  and  $\lambda_{SO_4^{2-}}^{\infty}$  are the equivalent conductances at infinite dilution of the respective ions?

(a)  $2\lambda_{Al^{3+}}^{\infty} + 3\lambda_{SO_4^{2-}}^{\infty}$

(b)  $\lambda_{Al^{3+}}^{\infty} + \lambda_{SO_4^{2-}}^{\infty}$

(c)  $(\lambda_{Al^{3+}}^{\infty} + 3\lambda_{SO_4^{2-}}^{\infty}) \times 6$

(d)  $\frac{1}{3}\lambda_{Al^{3+}}^{\infty} + \frac{1}{2}\lambda_{SO_4^{2-}}^{\infty}$

4. The pressure exerted by 6.0g of methane gas in a  $0.03 \text{ m}^3$  vessel at  $129^\circ\text{C}$  is (Atomic masses: C = 12.01, H = 1.01 and  $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ )

(a) 215216 Pa      (b) 13409 Pa

(c) 41648 Pa      (d) 31684 Pa

5. Match List I (Equations) with List II (Types of process) and select the correct option.

	List I (Equations)		List II (Types of process)
A.	$K_p > Q$	1.	Non-spontaneous
B.	$\Delta G^\circ < RT \ln Q$	2.	Equilibrium
C.	$K_p = Q$	3.	Spontaneous and
D.	$T > \frac{U_H}{U_S}$	4.	endothermic
			Spontaneous

A   B   C   D

(a) 1   2   3   4

(b) 3   4   2   1

- (c) 4 1 2 3  
(d) 2 1 4 3

6. Among the following which one has the highest cation of anion size ratio?

- (a) CsI      (b) CsF  
(c) LiF      (d) NaF

7. Which of the following species is not electrophilic in nature?

- (a)  $\oplus$  Cl      (b) BH<sub>3</sub>  
(c)  $\oplus$  H<sub>3</sub>O      (d)  $\oplus$  NO<sub>2</sub>

8. Match List I (Substances) with List II (Processes employed in the manufacture of the substances) and select the correct option.

	List I (Substances)		List II (Processes)
A.	Sulphuric acid	1.	Haber's process
B.	Steel	2.	Bessemer's process
C.	Sodium hydroxide	3.	Leblanc process
D.	Ammonia	4.	Contact process

Codes

A B C D

- (a) 1 4 2 3  
(b) 1 2 3 4  
(c) 4 3 2 1  
(d) 4 2 3 1

9. When glycerol is treated with excess of HI, it produces

- (a) 2-iodopropane      (b) allyl iodide  
(c) propene      (d) glycerol triiodide

10. Some statements about heavy water are given below.

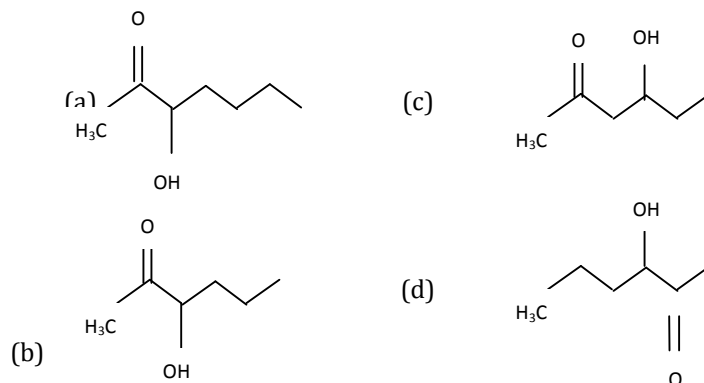
- (i) Heavy water is used as moderator in nuclear reactors  
(ii) Heavy water is more associated than ordinary water  
(iii) Heavy water is more effective solvent than ordinary water

Which o-f the above statements are correct?

- (a) (i) and (ii)      (b) (i),(ii) and (iii)

- (c) (ii) and (iii) (d) (i) and (iii)

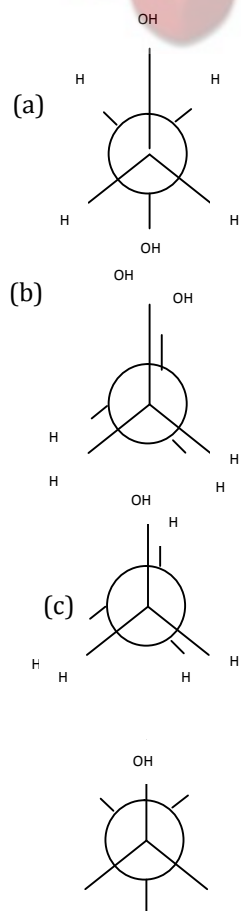
11. Which of the following compounds will be most readily dehydrated?



12. Which one of the following complexes is not expected to exhibit isomerism?

- (a)  $[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$
- (b)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
- (c)  $[\text{Ni}(\text{NH}_3)_2\text{Cl}_2]$
- (d)  $[\text{Ni}(\text{en})_2]^{2+}$

13. Which of the following conformers for ethylene glycol is most stable?



(d)

14. The IUPAC name of the compound  $\text{CH}_3\text{CH}=\text{CHC}\equiv\text{CH}$  is

- (a) pent-4-yn-2-ene
- (b) pent-3-en-1-yne
- (c) pent-2-en-4-yne
- (d) pent-1-yn-3-ene

15. Which of the following oxidation states is the most common among the lanthanoids?

- (a) 4
- (b) 2
- (c) 5
- (d) 3

16. Some of the properties of the two species,  $\text{NO}_3^-$  and  $\text{H}_3\text{O}^+$  are described below. Which one of them is correct?

- (a) Dissimilar in hybridisation for the central atom with different structures
- (b) Isostructural with same hybridization for the central atom
- (c) Isostructural with same hybridization for the central atom
- (d) Similar in hybridization for the central atom with different structures

17. Following compound are given

- (i)  $\text{CH}_3\text{CH}_2\text{OH}$
- (ii)  $\text{CH}_3\text{COCH}_3$
- (iii)  $\begin{array}{c} \text{CH}_3-\text{CHOH} \\ | \\ \text{CH}_3 \end{array}$
- (iv)  $\text{CH}_3\text{OH}$

Which of the above compound (s) on being warmed with indine solution and NaOH, will give iodoform?

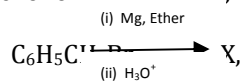
- (a) (i), (III) and (iv)
- (b) Only (ii)
- (c) (i), (ii) and (iii)
- (d) (i) and (ii)

18. Fructose reduces Tollen's reagent due to

- (a) asymmetric carbons

- (ii) primary alcoholic group
- (iii) secondary alcoholic group
- (iv) enolisation of fructose followed by conversion to aldehyde by base

19. In the following reaction,



The product 'X' is

- (a)  $\text{C}_6\text{H}_5\text{CH}_2\text{OCH}_2\text{C}_6\text{H}_5$
  - (b)  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
  - (c)  $\text{C}_6\text{H}_5\text{CH}_3$
  - (d)  $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$
20. Which of the following is not a fat soluble vitamin?

- (a) Vitamin - B complex
- (b) Vitamin-D
- (c) Vitamin - E
- (d) Vitamin - A

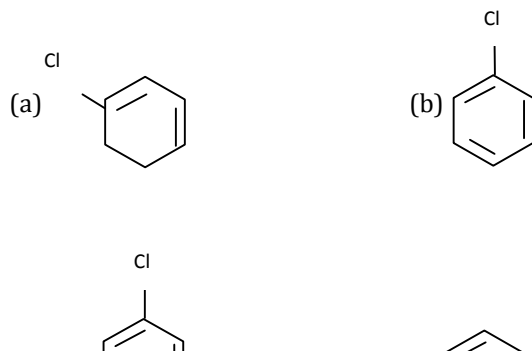
21. Which of the statements about 'Denaturation' given below are correct?

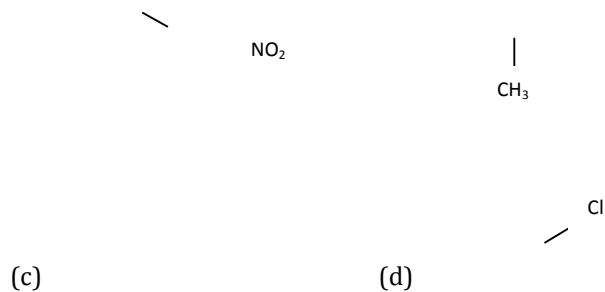
- (i) Denaturation of proteins cause loss of secondary and tertiary structures of the protein
  - (ii) Denaturation leads to the conversion of double stand of DNA into single stand.
  - (iii) Denaturation affects primary structure which gets destroyed.
- (a) (ii) and (iii)
  - (b) (i) and (iii)
  - (c) (i) and (ii)
  - (d) (i), (ii) and (iii)

22. Which of the maximum number of molecules among the following?

- (a) 44 g  $\text{CO}_2$
- (b) 48 g  $\text{O}_3$
- (c) 8 g  $\text{H}_2$
- (d) 64 g  $\text{SO}_2$

23. Which of the following compounds undergoes nucleophilic substitution reaction most easily





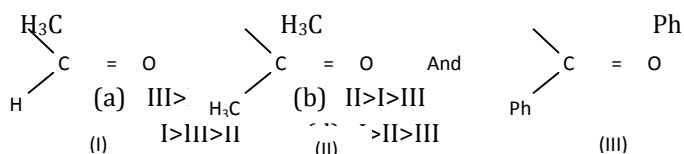
24. A 0.1 molal aqueous solution of a weak acid is 30% ionized. If  $K_f$  for water is  $1.86^\circ \text{C/m}$ , the freezing point of the solution will be

- (a)  $-0.18^\circ \text{C}$       (b)  $-0.54^\circ \text{C}$   
 (c)  $-0.36^\circ \text{C}$       (d)  $-0.24^\circ \text{C}$

25. Which of the following carbonyls will have the strongest C - O bond?

- (a)  $\text{Mn}(\text{CO})_6^+$   
 (b)  $\text{Cr}(\text{CO})_6$   
 (c)  $\text{V}(\text{CO})_6^-$   
 (d)  $\text{Fe}(\text{CO})_5$

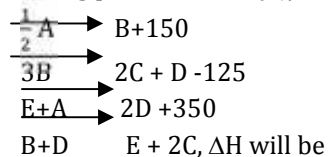
26. The order of reactivity of phenyl magnesium (PhMgBr) with the following Compounds



27. A solid compound XY has NaCl structure. If the radius of the cation is 100 pm, the radius of the anion ( $\text{Y}^-$ ) will be

- (a) 275.1 pm      (b) 322.5 pm  
 (c) 241.5 pm      (d) 165.7 pm

28. Consider the following processes  $\Delta H$  (KJ/mol)



- (a) 525 KJ/mol      (b) -175 KJ/mol  
 (c) -325 KJ/mol      (d) 325 KJ/mol

29. Match the compounds given in list I with List II and select the suitable option using the codes given below.

Codes

A B C D

(a) 4 1 3 2

	List I		List II
A.	Benzaldehyde	1.	Phenolphthalein
B.	Phthalic anhydride	2.	Benzoin condensation
C.	Phenyl benzoate	3.	Oil of wintergreen
D.	Methyl salicylate	4.	Fries rearrangement

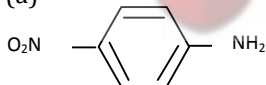
(b) 4 2 3 1

(c) 2 3 4 1

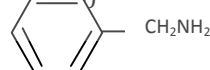
(d) 2 1 4 3

30. Which of the following compounds is the most basic?

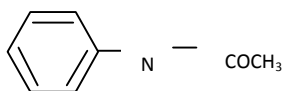
(a)



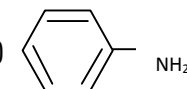
(b)



(c)



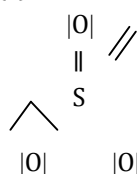
(d)



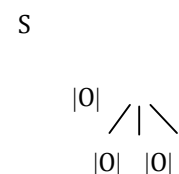
H

31. Which of the following structures is the most preferred and hence of lower energy for  $\text{SO}_3$  and hence of lowest energy for  $\text{SO}_3$ ?

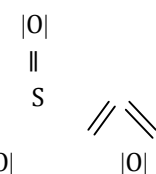
(a)



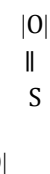
(b)



(c)



(d)



32. What is the value of electron gain enthalpy of  $\text{Na}^+$  if  $\text{IE}_1$  of  $\text{Na} = 5.1 \text{ eV}$ ?

- (a)  $-5.1 \text{ eV}$     (b)  $-10.2 \text{ eV}$   
 (c)  $+2.55 \text{ eV}$     (d)  $+10.2 \text{ eV}$

33. The unit of rate constant for a zero order reaction is

- (a)  $\text{mol L}^{-1} \text{ s}^{-1}$     (b)  $\text{L mol}^{-1} \text{ s}^{-1}$   
 (c)  $\text{L}^2 \text{ mol}^{-2} \text{ s}^{-1}$     (d)  $\text{s}^{-1}$

34. A bubble of air is underwater at temperature  $15^\circ\text{C}$  and the pressure  $1.5 \text{ bar}$ . If the bubble rises to the surface where the temperature is  $25^\circ\text{C}$  and the pressure is  $1.0 \text{ bar}$ , What will happen to the volume of the bubble?

- (a) Volume will become greater by a factor of 1.6  
 (b) Volume will become greater by a factor of 1.1  
 (c) Volume will become smaller by a factor of 0.70  
 (d) Volume will become greater by a factor of 2.9

35. Match List I with List II for the compositions of substances and select the correct answer using the codes given below the lists.

	List I (Substances)		List II (Composition)
A.	Plaster of Paris	1.	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
B.	Epsomite	2.	$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$
C.	Kieserite	3.	$\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$
D.	Gypsum	4.	$\text{H}_2\text{O}$
		5.	$\text{CaSO}_4$

**Codes**

A   B   C   D

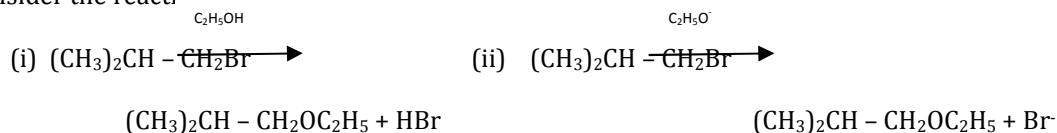
- (a)    3   4   1   2  
 (b)    2   3   4   1  
 (c)    1   2   3   5  
 (d)    4   3   2   1

36. The pairs of species of oxygen and their magnetic behaviours are noted below. Which of the following present the correct description?

- (a)  $\text{O}_2, \text{O}_2^{2-}$  – Both diamagnetic  
 (b)  $\text{O}^+, \text{O}_2^{2-}$  – Both paramagnetic  
 (c)  $\text{O}_2^+, \text{O}_2$  – Both paramagnetic  
 (d)  $\text{O}, \text{O}_2^{2-}$  – Both paramagnetic



37. Consider the reactions



The mechanisms of reactions (i) and (ii) are respectively

- (a)  $S_N 1$  and  $S_N 2$
- (b)  $S_N 1$  and  $S_N 1$
- (c)  $S_N 2$  and  $S_N 2$
- (d)  $S_N 2$  and  $S_N 1$

38. Which of the following complex compounds will exhibit highest paramagnetic behavior?

(At. No. Ti = 22, Cr = 24, Co = 27, Zn = 30)

- (a)  $[Ti(NH_3)_6]^{3+}$
- (b)  $[Cr(NH_3)_6]^{3+}$
- (c)  $[Co(NH_3)_6]^{3+}$
- (d)  $[Zn(NH_3)_6]^{3+}$

39. Which of the following oxide is amphoteric?

- (a)  $SnO_2$
- (b)  $CaO$
- (c)  $SiO_2$
- (d)  $CO_2$

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40. The following reactions take place in the blast furnace in the preparation of impure iron. Identify the reaction pertaining to the formation of the slag.

- (a)  $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(l)$
- (b)  $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
- (c)  $CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)$
- (d)  $2C(s) + O_2(g) \rightarrow 2CO(g)$