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## Previous Year Paper

Chemistry - 2010



## Multiple Choice Questions

1. The number of electrons, neutrons and protons in a species are equal to 10, 8 and 8 respectively. The proper symbol of the species
- A. O816
  - B. O2-816
  - C. O-816
  - D. O818

Answer

2. A 600 W mercury lamp emits monochromatic radiation of wavelength 331.3 nm. How many photons are emitted from the lamp per second? ( $h = 6.626 \times 10^{-34}$  Js; velocity of light =  $3 \times 10^8$  ms<sup>-1</sup>).
- A.  $1 \times 10^{19}$
  - B.  $1 \times 10^{22}$
  - C.  $1 \times 10^{21}$
  - D.  $1 \times 10^{23}$

Answer

3. The shortest wavelength in hydrogen spectrum of Lyman series when  $R_H = 109678$  cm<sup>-1</sup> is
- A. 1002.7 Å
  - B. 1215.67 Å
  - C. 1127.30 Å
  - D. 911.7 Å

Answer

4. Which of the following statements is false?
- A. H<sub>2</sub> molecule has 1σ bond
  - B. Acetylene molecule has 3σ bonds and 3Π bonds
  - C. HCl molecule has 1σ bond
  - D. Water molecule has 2σ bonds and two lone pairs

Answer

5. N<sub>2</sub> and O<sub>2</sub> are converted to monovalent cation N<sub>2</sub><sup>+</sup> and O<sub>2</sub><sup>+</sup> respectively. Which is incorrect?
- A. In N<sub>2</sub><sup>+</sup>, the N-N bond weakened.
  - B. In O<sub>2</sub><sup>+</sup>, the bond order increases

Answer

6. A neutral molecule  $\text{XF}_3$  has a zero dipole moment. The element X is most likely

- A. chlorine
- B. boron
- C. nitrogen
- D. carbon

Answer

7. 56 g of nitrogen and 96 g of oxygen are mixed isothermally and at a total pressure of 10 atm. The partial pressures of oxygen and nitrogen (in atm) are respectively

- A. 6,4
- B. 4,6
- C. 5,5
- D. 2,8

Answer

8. How much time (in hours) would it take to distribute one Avogadro number of wheat grains, if  $10^{20}$  grains are distributed each second?

- A. 0.1673
- B. 1.673
- C. 16.73
- D. 167.3

Answer

9. The first ( $\Delta H_1$ ) and second ( $\Delta H_2$ ) ionisation enthalpies (in  $\text{kJ mol}^{-1}$ ) and the ( $\Delta_{\text{eg}}\text{H}$ ) electron gain enthalpy (in  $\text{kJ mol}^{-1}$ ) of the elements I, II, III, IV and V are given below

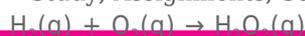
Element	$\Delta H_1$	$\Delta H_2$	$\Delta_{\text{eg}}\text{H}$
I	520	7300	-60
II	419	3051	-48
III	1681	3374	-328
IV	2372	5251	+48

The most reactive metal and the least reactive non-metal of these are respectively

- A. I and IV
- B. IV and II
- C. II and IV
- D. III and IV

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10. Calculate the standard enthalpy change (in  $\text{kJ mol}^{-1}$ ) for the reaction  
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Given that bond enthalpies of H-H, O=O, O-H and O-O (in  $\text{kJ mol}^{-1}$ ) are respectively 438, 498, 464 and 138.

- A. -130
- B. -65
- C. +130
- D. -334

Answer

11. According to the first law of thermodynamics which of the following quantities represents the change in a state function?

- A.  $q_{\text{rev}} + W_{\text{rev}}$
- B.  $q_{\text{rev}}$
- C.  $q_{\text{rev}} - W_{\text{rev}}$
- D.  $q_{\text{rev}} / W_{\text{rev}}$

Answer

12. The aqueous solution of which of the salt has pH close to 7?

- A.  $\text{FeCl}_3$
- B.  $\text{CH}_3\text{COONa}$
- C. KCN
- D.  $\text{CH}_3\text{COONH}_4$

Answer

13. Consider the following reactions in which all the reactants and the products are in gaseous state

$2\text{PQ} \rightleftharpoons \text{P}_2 + \text{Q}_2$ ;  $K_1 = 2.5 \times 10^5$   
 $\text{PQ} + 12\text{R}_2 \rightleftharpoons \text{PQR}$ ;  $K_2 = 5 \times 10^{-3}$   
 The value of  $K_3$  for the equilibrium  
 $12\text{P}_2 + 12\text{Q}_2 + 12\text{R}_2 \rightleftharpoons \text{PQR}$ , is

- A.  $2.5 \times 10^{-3}$
- B.  $2.5 \times 10^3$
- C.  $1.0 \times 10^{-5}$
- D.  $5 \times 10^3$

Answer

14. 200 mL of water is added to a 500 mL of 0.2 M solution. What is the molarity of this diluted solution?

- A. 0.5010M

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D. 0.1428

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Answer

15. If the activation energy for the forward reaction is  $150 \text{ kJ mol}^{-1}$  and that of the reverse reaction is  $260 \text{ kJ mol}^{-1}$ , what is the enthalpy change for the reaction?
- A.  $410 \text{ kJ mol}^{-1}$   
B.  $110 \text{ kJ mol}^{-1}$   
C.  $-110 \text{ kJ mol}^{-1}$   
D.  $-410 \text{ kJ mol}^{-1}$

Answer

16. All carbon atoms are  $sp^2$ -hybridised in
- A. 1, 3-butadiene  
B.  $\text{CH}_2=\text{C}=\text{CH}_2$   
C. cyclohexane  
D. 2-butene

Answer

17. The decreasing order of acidic character among ethane (I), ethene (II), ethyne (III) and propyne (IV) is
- A. (I) > (II) > (III) > (IV)  
B. (II) > (III) > (I) > (IV)  
C. (III) > (IV) > (II) > (I)  
D. (IV) > (III) > (II) > (I)

Answer

18. The alkene that will give the same product with HBr in the absence as well as in the presence of peroxide is
- A. 2-butene  
B. 1-butene  
C. propene  
D. 2-methylpropene

Answer

19. Hyperconjugation is most useful for stabilising which of the following carbocations?
- A. Neo-pentyl  
B. Tert-butyl  
C. Iso-propyl  
D. Ethyl

Answer

20. The isomerism that arises due to restricted bond rotation is

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C. position isomerism

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D. geometrical isomerism

Answer

21. The IUPAC name of the following compound,  $[(\text{CH}_3)_2\text{CH}-\text{CH}_2-\text{CH}=\text{CH}-\text{CH}=\text{CH}(\text{C}_2\text{H}_5)-\text{CH}_3]$  is

- A. 2, 8-dimethyl-4, 6-decadiene
- B. 1, 1, 7, 7-tetramethyl-2, 5-octadiene
- C. 1, 5-diisopropyl-1, 4-hexadiene
- D. 3, 9-dimethyl-4, 6-decadiene

Answer

22. Chlorination of benzene in the presence of halogen carrier is an example of

- A. aromatic nucleophilic substitution
- B. aromatic electrophilic substitution
- C. aromatic nucleophilic addition
- D. aromatic electrophilic addition

Answer

23. Aryl halides doesn't undergo nucleophilic substitution reactions under ordinary conditions because of

- 1. approach of nucleophile is retarded
- 2. carbon carrying halogen atoms is  $\text{sp}^3$ -hybridised
- 3. the substrate molecule is destabilised due to resonance
- 4. partial double bond character between carbon and halogen

- A. 2 and 4 only
- B. 1 and 4 only
- C. 2 and 3 only
- D. 2, 3 and 4 only

Answer

24. Which of the following undergoes reduction with hydrogen peroxide in alkaline medium?

- A.  $\text{Mn}^{2+}$
- B. FeO
- C. PbS
- D. HOCl

Answer

25. The metal that produces red-violet colour in the non-luminous flame is

- A. Ba
- B. Ag
- C. Rb
- D. Pb

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26. In Lassaigne's test for the detection of halogens, the sodium fusion extract is first boiled with concentrated nitric acid. This is

- A. to remove silver halides
- B. to decompose  $\text{Na}_2\text{S}$  and  $\text{NaCN}$ , if present
- C. to dissolve  $\text{Ag}_2\text{S}$
- D. to dissolve  $\text{AgCN}$ , if formed

Answer

27. In Lassaigne's test for the detection of halogens, the sodium fusion extract is first boiled with concentrated nitric acid. This is

- A. to remove silver halides
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- D. to dissolve  $\text{AgCN}$ , if formed

Answer

28. According to Ellingham diagram, the oxidation reaction of carbon to carbon monoxide may be used to reduce which one of the following oxides at the lowest temperature?

- A.  $\text{Al}_2\text{O}_3$
- B.  $\text{Cu}_2\text{O}$
- C.  $\text{MgO}$
- D.  $\text{ZnO}$

Answer

29. Halogens exist in -1, +1, +3, +5 and +7 oxidation states. The halogen that exists only in -1 state is

- A. F
- B. Cl
- C. Br
- D. I

Answer

30. Among the oxyacids of phosphorus, the dibasic acid is

- A.  $\text{H}_3\text{PO}_3$
- B.  $\text{H}_4\text{P}_2\text{O}_7$
- C.  $\text{H}_2\text{PO}_2$
- D.  $\text{HPO}_3$

Answer

31. Pick out the correct statement(s).

1. Manganese exhibits +7 oxidation state
2. Zinc forms coloured ions

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3.  $[\text{CoF}_6]^{3-}$  is diamagnetic
4. Sc forms +4 oxidation state
5. Zn exhibits only +2 oxidation state

- A. 1 and 2  
B. 1 and 5  
C. 2 and 4  
D. 3 and 4

Answer

32. The maximum oxidation state exhibited by actinide ions is

- A. +5  
B. +4  
C. +7  
D. +8

Answer

33. The amount of solute (molar mass  $60 \text{ g mol}^{-1}$ ) that must be added to 180 g of water so that the vapour pressure of water is lowered by 10%, is

- A. 30g  
B. 60g  
C. 120g  
D. 12g

Answer

34. Which of the following species can function both as oxidising as well as reducing agent?

- A.  $\text{Cl}^-$   
B.  $\text{ClO}_4^-$   
C.  $\text{ClO}^-$   
D.  $\text{MnO}_4^-$

Answer

35. One Faraday of electricity is passed through molten  $\text{Al}_2\text{O}_3$ , aqueous solution of  $\text{CuSO}_4$  and molten  $\text{NaCl}$  taken in three different electrolytic cells connected in series. The mole ratio of Al, Cu and Na deposited at the respective cathode is

- A. 2: 3: 6  
B. 2: 3: 6  
C. 6 : 3 : 2  
D. 1 : 2: 3

Answer

36. Half-lives of a first order and a zero order reactions are same. Then, the ratio of the initial rates of first order reaction to that of the zero order reaction is

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C. 0.693

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D. 0.93

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**Answer**

37. The dispersed phase and dispersion medium in soap lather are respectively

- A. gas and liquid
- B. liquid and gas
- C. solid and gas
- D. solid and liquid

**Answer**

38. In petrochemical industry, alcohols are directly converted to gasoline by passing over heated

- A. platinum
- B. ZSM-5
- C. iron
- D. nickel

**Answer**

39. Which among the following statements are true for the complex  $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ ?

- 1. It is a non-electrolyte
- 2. The magnitude of the charge on each complex ion is 3
- 3. The complex will not conduct current
- 4. The complex will exhibit coordination isomerism
- 5. The magnitude of the charge on each complex ion is 1

- A. 2 and 4
- B. 1 and 4
- C. 3 and 5
- D. 1 and 2

**Answer**

40. An example of ambidentate ligand is

- A. thiocyanato
- B. aquo
- C. chloro
- D. ammine

**Answer**

41. Choose the weakest acid among the following

- A.  $(\text{CH}_3)_2\text{CH}-\text{COOH}$
- B.  $\text{F}_3\text{C}-\text{COOH}$
- C.  $\text{F}-\text{CH}_2-\text{COOH}$
- D.  $\text{CH}_3-\text{COOH}$

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42. Aldehydes that do not undergo aldol condensation are

1. propanal
- 

2. Trichloroethane

3. methanal

4. benzaldehyde

A. 3 and 4 only

B. 1, 2 and 3 only

C. 3 and 4 only

D. 2, 3 and 4 only

Answer

43. Which compound among the following give/s positive iodoform test?

1. Ethanol

2. Ethanal

3. 1-butanol

4. 2-butanol

A. 1, 2 and 4

B. 1, 3 and 4

C. 1, 2 and 3

D. 1 and 2

Answer

44. Amine that cannot be prepared by Gabriel phthalimide synthesis is

A. aniline

B. benzylamine

C. methylamine

D. iso-butylamine

Answer

45. Which of the following is the least basic amine?

A. Ethylamine

B. Diethylamine

C. Aniline

D. Benzylamine

Answer

46. Which of the following bases is not present in DNA?

A. Uracil

B. Adenine

C. Thymine

D. Guanine

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47. Lactose is made of

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A.  $\alpha$ -D-glucose only

B.  $\alpha$ -D-glucose and  $\beta$ -D-glucose

C.  $\alpha$ -D-galactose and  $\beta$ -D-glucose

D.  $\beta$ -D-galactose and  $\beta$ -D-glucose

Answer

48. The artificial sweetener containing chlorine that has the appearance and taste as that of sugar and stable at cooking temperature is

A. aspartame

B. saccharin

C. sucrolose

D. alitame

Answer

49. Cetyltrimethyl ammonium bromide is a popular

A. anionic detergent

B. cationic detergent

C. non-ionic detergent

D. sweetener

Answer