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Previous Year Paper

Chemistry - 2009

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Multiple Choice Questions

- The electrons, identified by quantum numbers n and l ,
(I) $n = 3; l = 2$; (II) $n = 5; l = 0$; (III) $n = 4; l = 1$; (IV) $n = 4; l = 2$; (V) $n = 4; l = 0$;
can be placed in order of increasing energy as-

A. $I < V < III < IV < II$
B. $I < V < III < II < IV$
C. $V < I < III < II < IV$
D. $V < I < II < III < IV$
[Answer](#)
- The number of photons emitted per second by a 60 W source of monochromatic light of wavelength 663 nm is ($h = 6.63 \times 10^{-34}$ Js)

A. 4×10^{-20}
B. 1.5×10^{20}
C. 3×10^{-20}
D. 2×10^{20}
[Answer](#)
- Among the following species, identify the pair having same bond order CN^- , O_2^- , NO^+ , CN^+

A. CN^- and O_2^-
B. O_2^- and NO^+
C. CN^- and NO^+
D. CN^- and CN^+
[Answer](#)
- Hydration of different ions in aqueous solution is an example of

A. ion-dipole interaction
B. ion-induced dipole interaction
C. dipole-dipole interaction
D. dipole-induced dipole interaction
[Answer](#)
- When a sample of gas is compressed at constant temperature from 15 atm to 60 atm, its volume changes from 76 cm^3 to 20.50 m^3 . Which of the following statements are possible explanations
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1. The gas behaves non-ideally

2. The gas dimerises

3. The gas is adsorbed into the vessel walls

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

Answer

6. The vapour pressure of two liquids X and Y are 80 and 60 Torr respectively. The total vapour pressure of the ideal solution obtained by mixing 3 moles of X and 2 moles of Y would be

- A. 68 Torr
- B. 140 Torr
- C. 48 Torr
- D. 72 Torr

Answer

7. 'Hydride Gap' is referred to which region of the Periodic Table ?

- A. Groups 3, 4 and 5
- B. Groups 5, 6 and 7
- C. Groups 4, 5 and 6
- D. Groups 7, 8 and 9

Answer

8. Which of the following pairs of substances would give same gaseous product on reaction with water?

- A. Na and Na_2O_2
- B. Ca and CaH_2
- C. Ca and CaO
- D. Ba and BaO_2

Answer

9. The shape of XeF_4 molecule and hybridisation of xenon in it are

- A. tetrahedral and sp^3
- B. square planar and dsp^2
- C. square planar and sp^3d^2
- D. octahedral and sp^3d^2

Answer

10. Energy released, when one atom of uranium undergoes nuclear fission according to the following reaction is (atomic mass of U = 235.060; n = 1.009; Ba = 143.881 and Kr = 89.947) about

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- B. 208 MeV
 C. 931.5 MeV
 D. 5.33×10^{23} MeV

Answer

11. When 0.2 g of 1-butanol was burnt in a suitable apparatus, the heat evolved was sufficient to raise the temperature of 200 g water by 5°C. The enthalpy of combustion of 1-butanol in kcal mol⁻¹ will be
- A. +37
 B. +370
 C. -370
 D. -740

Answer

12. Given that $dE = Tds - pdV$ and $H = E + pV$. Which one of the following relations is true ?
- A. $dH = Tds + Vdp$
 B. $dH = SdT + Vdp$
 C. $dH = -SdT + Vdp$
 D. $dH = dE + pdV$

Answer

13. When 200 mL of aqueous solution of HCl (pH = 2) is mixed with 300 mL of an aqueous solution of NaOH (pH = 12) the pH of the resulting mixture is
- A. 10
 B. 2.7
 C. 4.0
 D. 11.3

Answer

14. At a certain temperature, the dissociation constants of formic acid and acetic acid are 1.8×10^{-4} and 1.8×10^{-5} respectively. The concentration of acetic acid solution in which the hydrogen ion has the same concentration as in 0.001 M formic acid solution is equal to
- A. 0.01 M
 B. 0.001 M
 C. 0.1 M
 D. 0.0001 M

Answer

15. In acid medium, Zn reduces nitrate ion to NH₄⁺ ion according to the reaction,



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availability of sufficient Zn.

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A. 5

B. 4

C. 3

D. 2

Answer

16. Match List-I and List-II and choose the correct matching codes.

List - I	List - II
A. $[\text{Ni}(\text{CN})_4]^{2-}$	1. Ti^{4+}
B. Chlorophyll	2. sp^3 ; paramagnetic
C. Ziegler- Natta catalyst	3. non-planar
D. $[\text{NiCl}_4]^{2-}$	4. Mg^{2+}
E. Deoxyhaemoglobin	5. Planar 6. dsp^2 ; diamagnetic

A. A - 6; B - 4; C - 1; D - 2; E - 3

B. A - 2; B - 4; C - 1; D - 6; E - 3

C. A - 2; B - 4; C - 1; D - 6; E - 5

D. A - 6; B - 4; C - 1; D - 2; E - 5

Answer

17. What is the overall formation equilibrium constant for the ion $[\text{ML}_4]^{2-}$ ion, given that β_4 for this complex is 2.5×10^{13} ?

A. 2.5×10^{13}

B. 5×10^{-13}

C. 2.5×10^{-14}

D. 4.0×10^{-13}

Answer

18. In which of the following species, all the three types of hybrid carbons are present ?

A. $\text{CH}_2=\text{C}=\text{CH}_2$

B. $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_2+$

C. $\text{CH}_3-\text{C}\equiv\text{C}-\text{CH}_2+$

D. $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_2-$

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19. Which one of the following pairs of substances will not produce hydrogen when reacted together?

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A. Copper and conc. nitric acid

B. Ethanol and metallic sodium

C. Magnesium and steam

D. Phenol and metallic sodium

Answer

20. A compound in which a metal ion M^{x+} ($Z = 25$) has a spin only magnetic moment of 24 BM. The number of unpaired electrons in the compound and the oxidation state of the metal ion are respectively

A. 4 and 2

B. 5 and 3

C. 3 and 2

D. 4 and 3

Answer

21. To an aqueous solution containing anions a few drops of acidified $KMnO_4$ are added. Which one of the following anions, if present will not decolourise the $KMnO_4$ solution ?

A. I^-

B. CO_3^{2-}

C. S^{2-}

D. NO_2^-

Answer

22. In the following reaction,



If one mole of MnO_4^- oxidises 2.5 moles of M^{x+} , then the value of x is

A. 5

B. 3

C. 2

D. 1

Answer

23. 0.25 g of an organic compound on Kjeldahl's analysis gave enough ammonia to just neutralize 10 cm^3 of 0.5 M H_2SO_4 . The percentage of nitrogen in the compound is

A. 28

B. 56

C. 14

D. 112

Answer

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A. $\text{H}_2\text{N}-\text{CO}-\text{NHNH}_2 \cdot \text{HCl}$

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B. $\text{NH}_2-\text{NH}_2 \cdot \text{HCl}$ C. $\text{NH}_2-\text{CO}-\text{NH}_2$ D. $\text{C}_6\text{H}_5-\text{NH}-\text{NH}_2 \cdot \text{HCl}$

Answer

25. When tetrahydrofuran is treated with excess HI, the product formed is

A. 1, 4-diiodobutane

B. 1,4-butanediol

C. 2-iodotetrahydrofuran

D. 4-iodo-1-butanol

Answer

26. Pick out the correct statements from the following and choose the correct answer from the codes given below

1. Hexa-1, 5-diene is a conjugated diene

2. Prop-1, 2-diene is conjugated diene

3. Hexa-1, 3-diene is a conjugated diene

4. Buta-1, 3-diene is an isolated diene

5. Prop-1, 2-diene is a cumulative diene

A. 1, 2

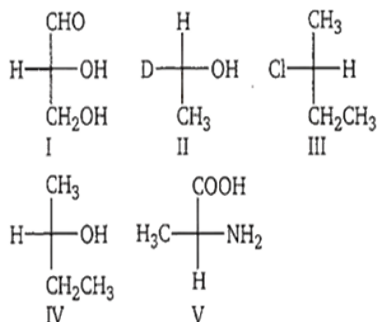
B. 3, 5

C. 2, 3

D. 4, 5

Answer

27. Select R-isomers from the following



A. I and III

B. II, IV and V

C. I, II and III

D. II and III

Answer

28. The correct IUPAC name of the acid

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- ~~A. Z-3-ethyl-4-methyl-hex-3-en-1-oic acid~~
B. E-3-ethyl-4-ethylhex-3-en-1-oic acid
C. Z-3-ethyl-4-methyl hexanoic acid
D. Z-3, 4-diethylpent-3-en-1-oic acid

Answer

29. $(\text{CH}_3)_3\text{CMgCl}$ on reaction with D_2O produces

- A. $(\text{CH}_3)_3\text{COD}$
B. $(\text{CD}_3)_3\text{CH}$
C. $(\text{CH}_3)_3\text{CD}$
D. $(\text{CD}_3)_3\text{CD}$

Answer

30. The elements present in the core of earth are collectively known as

- A. lithophiles
B. nucleophiles
C. chalcophiles
D. siderophiles

Answer

31. Lead is the final product formed by a series of changes in which the rate determining stage is the radioactive decay of- uranium-238 with a half-life of 4.5×10^9 yr. What would be the age of a rock sample originally lead free in which the molar proportion of uranium to lead is now 1 : 3?

- A. 1.5×10^9 yr
B. 2.25×10^9 yr
C. 4.5×10^8 yr
D. 9.0×10^9 yr

Answer

32. An 1% solution of KCl (I), NaCl (II), BaCl_2 (III) and urea (IV) have their osmotic pressure at the same temperature in the ascending order (molar masses of NaCl, KCl, BaCl_2 and urea are respectively 58.5, 74.5, 208.4 and 60 g.mol^{-1}). Assume 100% ionization of the electrolytes at this temperature.

- A. $\text{III} < \text{IV} < \text{I} < \text{II}$
B. $\text{I} < \text{III} < \text{II} < \text{IV}$
C. $\text{III} < \text{I} < \text{II} < \text{IV}$
D. $\text{I} < \text{III} < \text{IV} < \text{II}$

Answer

33. The difference between the boiling point and freezing point of an aqueous solution containing

sucrose (molecular wt = 342 g mol^{-1}) in 100 g of water is 105.0°C . If k_f and k_b of water are 1.86

and $0.51 \text{ K kg mol}^{-1}$ respectively, the weight of sucrose in the solution is about?

- A. 34.2 g
 B. 342 g
 C. 7.2 g
 D. 72 g

Answer

34. The activation energies of two reactions are E_1 and E_2 ($E_1 > E_2$). If the temperature of the system is increased from T_1 to T_2 , the rate constant of the reactions changes from k_1 to k_1' in the first reaction and k_2 to k_2' in the second reaction. Predict which of the following expression is
- A. $k_1'k_1 = k_2'k_2$
 B. $k_1'k_1 > k_2'k_2$
 C. $k_1'k_1 < k_2'k_2$
 D. $k_1'k_1 = k_2'k_2$

Answer

35. A reaction was observed for 15 days and the percentage of the reactant remaining after the days indicated was recorded in the following table

Time (days)	% reactant remaining
0	100
2	50
4	39
6	25
8	21
10	18
12	15
14	12.5
15	10

Which one of the following best describes the order and the half-life of the reaction?

- A. First - 2
 B. First - 6
 C. Second - 2
 D. Zero - 6

A. Al^{3+}

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B. Ba^{2+} C. Na^+ D. SO_4^{2-}

Answer

37. Which one of the following impurities present in colloidal solution cannot be removed by electrodialysis ?

A. Sodium chloride

B. Potassium sulphate

C. Urea

D. Calcium chloride

Answer

38. Concentrated sulphuric acid can be reduced by

A. NaCl B. NaF C. NaBr D. NaOH

Answer

39. The alkyl halide that undergoes $\text{S}_\text{N}1$ reaction more readily is

A. *t*-butyl bromideB. *n*-propyl bromide

C. vinyl bromide

D. isopropyl bromide

Answer

40. An alkyl halide (R-X) reacts with Na to form 4, 5-diethyloctane. Compound R-X is

A. $\text{CH}_3(\text{CH}_2)_3\text{Br}$ B. $\text{CH}_3(\text{CH}_2)_2\text{CH}(\text{Br})\text{CH}_2\text{CH}_3$ C. $\text{CH}_3(\text{CH}_2)_3\text{CH}(\text{Br})\text{CH}_3$ D. $\text{CH}_3(\text{CH}_2)_5\text{Br}$

Answer

41. A compound 'A' having the molecular formula $\text{C}_5\text{H}_{12}\text{O}$, on oxidation gives a compound 'B' with molecular formula $\text{C}_5\text{H}_{10}\text{O}$. Compound 'B' gave a 2, 4-dinitrophenylhydrazine derivative but did not answer haloform test or silver mirror test. The structure of compound 'A' is

A. $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-OH}$ B. $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-C(OH)(CH}_3\text{)-CH}_3$ C. $\text{CH}_3\text{-CH}_2\text{-C(OH)(CH}_3\text{)-CH}_2\text{-CH}_3$

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42. Which of the following is a better reducing agent for the following reduction?



- A. SnCl_2/HCl
- B. $\text{NaBH}_4/\text{ether}$
- C. $\text{B}_2\text{H}_6/\text{H}_3\text{O}^+$
- D. H_2/Pd

Answer

43. Choose the amide which on reduction with LiAlH_4 yields a secondary amine

- A. ethanamide
- B. N-methylethanamide
- C. N, N-dimethylethanamide
- D. phenylmethanamide

Answer

44. Arrange the following amines in the decreasing order of their basic strength. Aniline (I), Benzylamine (II), *p*-toluidine (III)

- A. $\text{I} > \text{II} > \text{III}$
- B. $\text{II} > \text{III} > \text{I}$
- C. $\text{III} > \text{II} > \text{I}$
- D. $\text{II} > \text{I} > \text{III}$

Answer

45. Which one among the following is not an analgesic?

- A. Ibuprofen
- B. Naproxen
- C. Aspirin
- D. Valium

Answer

46. Match the vitamin of column I with deficiency disease given in column II

Column -I	Column - II
1. Vitamin A	A. Scurvy
2. Vitamin B_{12}	B. Hemorrhagic condition
3. Vitamin C	C. Sterility
4. Vitamin E	D. Xerophthalmia
5. Vitamin K	E. Pernicious anaemia

Answer

47. Which of the following is a double base propellant ?

- A. Methyl nitrate and nitromethane
- B. Nitroglycerine and nitrocellulose
- C. Kerosine and alcohol
- D. Acrylic rubber and liquid N_2O_4

Answer

48. Bithional is added to soap as an additive to function as a/an

- A. hardener
- B. dryer
- C. antiseptic
- D. buffering agent

Answer