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Previous Year Paper

Chemistry - 2017

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Multiple Choice Questions

1. (i) $\text{H}_3\text{PO}_4(\text{aq}) \rightleftharpoons \text{H}^+(\text{aq}) + \text{H}_2\text{PO}_4^-(\text{aq})$ (ii) $\text{H}_2\text{PO}_4^-(\text{aq}) \rightleftharpoons \text{H}^+(\text{aq}) + \text{HPO}_4^{2-}(\text{aq})$ (iii) $\text{HPO}_4^{2-}(\text{aq}) \rightleftharpoons \text{H}^+(\text{aq}) + \text{PO}_4^{3-}(\text{aq})$

The equilibrium constants for the above reactions at a certain temperature are K_1 , K_2 and K_3 respectively. The equilibrium constant for the reaction $\text{H}_3\text{PO}_4(\text{aq}) \rightleftharpoons 3\text{H}^+(\text{aq}) + \text{PO}_4^{3-}(\text{aq})$ in terms of K_1 , K_2 and K_3 is

- A. $K_1 + K_2 + K_3$
- B. $K_1 K_2 + K_3$
- C. $K_3 K_1 K_2$
- D. $K_1 K_2 K_3$

Answer

2. Which among the following are having diamagnetic property?

(i) B_2 (ii) N_2 (iii) O_2 (iv) C_2

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

Answer

3. The equilibrium constant (K_c) for the following equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ at 563 K is 100. At equilibrium, the number of moles of SO_3 in the 10 litre flask is twice the number of moles of SO_2 , then the number of moles of oxygen is

- A. 0.4
- B. 0.3
- C. 0.2
- D. 0.1

Answer

4. The energy and radius of electron present in second orbit of He^+ respectively are

- A. $-109 \times 10^{-18} \text{ J}$, 105.8 pm
- B. $-872 \times 10^{-18} \text{ J}$, 211.6 pm
- C. $-4.36 \times 10^{-18} \text{ J}$, 52.9 pm
- D. $-2.18 \times 10^{-18} \text{ J}$, 105.8 pm

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5. Assertion (A): Na^+ and Mg^{2+} ions are isoelectronic but the ionic radius of Na^+ is greater than that of Mg^{2+} .

Reason (R): The effective nuclear charge of Na^+ ion is less than that of Mg^{2+} ion.

- A. Both (A) and (R) are correct but (R) is not the correct explanation of (A)
- B. Both (A) and (R) are correct and (R) is correct explanation of (A).
- C. (A) is not correct but (R) is correct.
- D. (A) is correct but (R) is not correct.

Answer

6. The work functions of Ag, Mg, K and Na respectively in eV are 4.3, 3.7, 2.25, 2.30. When an electromagnetic radiation of wavelength of 300 nm is allowed to fall on these metal surface, the number of metals from which the electrons are ejected is ($1\text{eV} = 1.6022 \times 10^{-19} \text{ J}$).

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

Answer

7. The Lewis structure for O_3 molecule is given below. The correct formal charges on oxygen atoms labelled 1, 2, 3 are respectively.



- A. -1, 0, +1
- B. +1, 0, -1
- C. +1, -1, 0
- D. 0, +1, -1

Answer

8. How many millilitres of 20 volume H_2O_2 solution is needed to react completely with 500 mL of acidified 1 N KMnO_4 solution?

- A. 224
- B. 280
- C. 140
- D. 56

Answer

9. If -239, -116 and -286 kJ mol^{-1} respectively. The enthalpy change for the oxidation of methanol to formaldehyde and water in kJ is

- A. -136

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C. 163

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D. -163

Answer

10. At 27°C in a 10 L flask 4.0 g of an ideal gaseous mixture containing. He (molar mass 4.0 g mol⁻¹) and Ne (molar mass 20g mol⁻¹) has a pressure of 1.23 atm. What is the mass of neon ? (R = 0.082 L atm K⁻¹ mol⁻¹).
- A. 25.2
B. 62.5
C. 84.2
D. 74.2

Answer

11. Which one of the following statements is not correct?
- A. The hydration enthalpies of alkali metal ions decrease down the group.
B. Lithium halides are some what covalent in nature
C. Alkali metals react with water liberating oxygen gas
D. KO₂ is paramagnetic.

Answer

12. Identify the statement which is not correct?
- A. Dehydrobromination of 2-bromopentane gives pent-1-ene as the major product
B. Freon 12 is manufactured by Swarts reaction
C. CHCl₃ is stored in closed, dark coloured bottles
D. Chronic exposure to CHCl₃ causes liver damage

Answer

13. The gaseous products formed at cathode (X) and anode (Y), when an aqueous solution of sodium acetate is electrolysed are

X	Y
CO ₂	C ₂ H ₆ , H ₂

X	Y
H ₂ , CO ₂	C ₂ H ₆

X	Y
H ₂	C ₂ H ₆ , CO ₂

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Answer

14. Identify the correct statements from the following

- (i) Electromeric effect is a permanent effect
- (ii) Hyper conjugation is a temporary effect
- (iii) Fractional distillation is used to separate two liquids from a mixture if the difference in their boiling points is less
- (iv) Different compounds are adsorbed on an adsorbent different extents

- A. ii, iii, iv
- B. i, ii, iii
- C. ii, iv
- D. iii, iv

Answer

15. Identify the correct statements for a ring system to exhibit aromaticity

- (i) It must not be planar
- (ii) The ring must contain $(4n+2)\pi$ electrons.
- (iii) The ring must be planar.
- (iv) It must possess $4n\pi$ electrons.

The correct answer is:

- A. ii, iv
- B. i, ii
- C. i, iv
- D. ii, iii

Answer

16. Identify, from the following, the diamagnetic, tetrahedral complex

- A. $[\text{Ni}(\text{Cl})_4]^{2-}$
- B. $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
- C. $[\text{Ni}(\text{CN})_4]^{2-}$
- D. $[\text{Ni}(\text{CO})_4]$

Answer

17. Which of the following forms holes in the ozone layer?

- A. CO
- B. SO_2

C. CO_2

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Answer

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18. To prepare XeF_6 , Xe and F_2 are mixed at 573 K and 60-70 bar in the ratio of

- A. 20:1
- B. 1:5
- C. 5:1
- D. 1:20

Answer

19. Which one of the following solutions of compounds show highest osmotic pressure? [AB, AB_2 , A_2B_3 are ionic compounds]

- A. 5.0 M urea $i = 10$ and temperature is 67°C
- B. 1.5M A_2B_2 type $i = 41$ temperature is 27°C
- C. 3.0 M AB type $i = 16$ and temperature is 27°C
- D. 2.5 M AB_2 type $i = 2.5$ and temperature is 57°C .

Answer

20. In which of the following reactions, hydrogen is liberated?

(i) $\text{Al(s)} + \text{HCl(aq)} \rightarrow$ (ii) $\text{Al(s)} + \text{NaOH(aq)} \rightarrow$ (iii) $\text{NaBH}_4 + \text{I}_2 \rightarrow$

- A. i, ii
- B. ii, iii
- C. i, iii
- D. i, ii, iii

Answer

21. 31g of ethylene glycol ($\text{C}_2\text{H}_6\text{O}_2$) is dissolved in 600 g of water. The freezing point depression of the solution is (K_f for water is $1.86 \text{ K kg mol}^{-1}$)

- A. 0.77 K
- B. 1.55 K
- C. 4.65 K
- D. 3.10 K

Answer

22. What are X and Y in the following reactions?

$\text{MnO}_4^- + \text{I}^- \rightarrow \text{H}^+ + \text{XMnO}_4^- + \text{I}_2 \rightarrow \text{H}_2\text{O} + \text{Y}$

- A. I_2 , IO_4^-
- B. I_2 , IO_3^-
- C. IO_3^- , IO_3^-
- D. IO_3^- , I_2 ,

Answer

23. Colloidal solution of gold is in different colours like red, purple, blue and golden because of
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B. size difference in the particles of gold

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C. presence of impurities

D. difference in the concentration of gold particles

Answer

24. Same amount of electricity is passed through aqueous solutions of AgNO_3 and CuSO_4 . The number of Ag and Cu atoms deposited are x and y respectively. The correct relationship between x and y is

A. $x < y$

B. $x = 2y$

C. $x = y$

D. $y = 2x$

Answer

25. 20% of a first order reaction was found to be completed at 10 a.m at 11.30 a.m. on the same day, 20% of the reaction was found to be remaining. The half life period in minutes of the reaction is

A. 90

B. 45

C. 60

D. 30

Answer

26. Two oxides of a non-metal X contain 50% and 40% of non-metal respectively. If the formula of the first oxide is XO_2 . Then the formula of second oxide is

A. X_2O_3

B. X_2O_5

C. XO_3

D. X_2O

Answer

27. Copper matte contains

A. CuO , FeS

B. Cu_2S , FeS

C. CuO , Cu_2S

D. Cu_2S , FeO

Answer

28. $\text{S} + \text{Conc. H}_2\text{SO}_4 \rightarrow \text{X} + \text{Y}$

Here X is a gas and Y is a liquid and both are triatomic molecules. The number of electron lone pairs present on the central atoms of X and Y are respectively.

A. 2,1

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C. 1,2

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D. 2,2

Answer

29. Which of the following is used in estimation of carbon monoxide?

- A. I_2O_4
- B. BrO_3
- C. Cl_2O_7
- D. I_2O_5

Answer

30. Which one of the following statements is not correct?

- A. In CO_2 molecule, carbon hybridisation is sp
- B. Fullerenes are made by heating graphite in an electric arc in the presence of argon gas
- C. Both $[\text{SiF}_6]^{2-}$ and $[\text{SiCl}_6]^{2-}$ ions are known
- D. In CO molecule, there are one 'sigma' and two 'pi' bonds

Answer

31. An element has a body centered cubic structure with a unit cell edge length of 400 pm. Atomic mass of an element is 24 g mol^{-1} . What is the density of the element? ($N_A = 6 \times 10^{23} \text{ mol}^{-1}$)

- A. 2.50 g cm^{-3}
- B. 1.80 g cm^{-3}
- C. 3.60 g cm^{-3}
- D. 1.25 g cm^{-3}

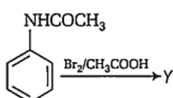
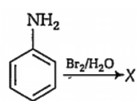
Answer

32. Which one of the following is more reactive towards SN_2 reaction ?

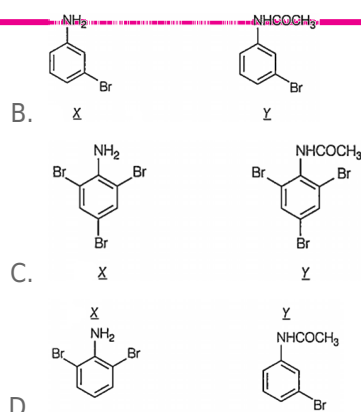
- A. $(\text{CH}_3)_3\text{CX}$
- B. $(\text{CH}_3)_2\text{CHX}$
- C. $\text{CH}_3\text{CH}_2\text{X}$
- D. CH_3X

Answer

33. What are X and Y in the following reactions?



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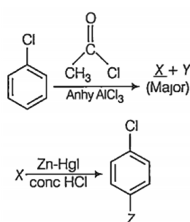
Answer

34. Which one of the following is not used as an initiator in ionic polymerisation?

- A. NaNH_2
 B. SnCl_2
 C. AlCl_3
 D. $(\text{C}_6\text{H}_5\text{CO})_2\text{O}_2$

Answer

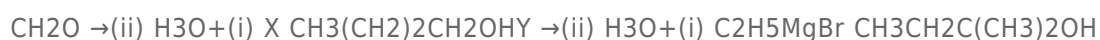
35. What is Z in the following sequence of reactions?



- A. $-\text{CO}-\text{CH}_3$
 B. $-\text{CO}-\text{Cl}$
 C. $-\text{CH}_3$
 D. $-\text{CH}_2-\text{CH}_3$

Answer

36. What are X and Y in the following reactions?



X	Y
$\text{CH}_3-\text{CH}(\text{CH}_3)-\text{MgBr}$	$\text{C}_2\text{H}_5\text{COCH}_3$

X	Y
$\text{CH}_3\text{CH}_2\text{CH}_2\text{MgBr}$	$\text{CH}_3-\text{CO}-\text{CH}_3$

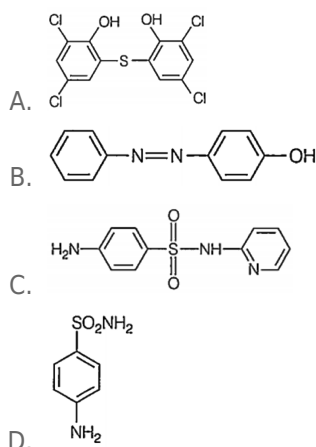
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X	Y
$\text{CH}_3\text{-CH}_2\text{-MgBr}$	$\text{CH}_3\text{CH}_2\text{CHO}$

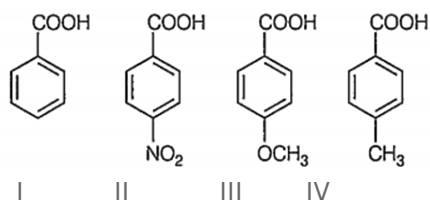
Answer

37. Which of the following structure represents the compound, generally added to soaps to impart antiseptic properties?



Answer

38. The increasing order of acidity of the following carboxylic acids is



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

Answer

39. Identify the statement which is not correct from the following.
- (i) Carbohydrates are stored as glycogen in animals.
 - (ii) In glycylalanine, CO of peptide bond belongs to alanine.
 - (iii) Base - sugar- phosphate unit is known as nucleoside.
 - (iv) Obesity is due to hypothyroidism.

The correct answer is:

- A. i, iv

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C. i, iii, iv

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Answer

40. The drug, which was designed to prevent the interaction of histamine with the receptors present in the stomach wall is
- A. prontosil
 - B. cimetidine
 - C. aspartame
 - D. equanil

Answer