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Previous Year Paper

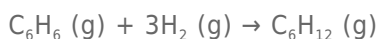
Chemistry - 2015

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Multiple Choice Questions

1. Gaseous benzene reacts with hydrogen gas in presence of a nickel catalyst to form gaseous cyclohexane according to the reaction,

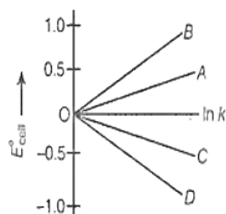


A mixture of C_6H_6 and excess H_2 has a pressure of 60 mm of Hg in an unknown volume. After the gas had been passed over a nickel catalyst and all the benzene converted to cyclohexane, the pressure of the gas was 30 mm of Hg in the same volume at the same temperature. The fraction of C_6H_6 (by volume) present in the original volume is

- A. 1/3
- B. 1/4
- C. 1/5
- D. 1/6

[Answer](#)

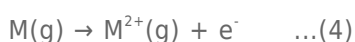
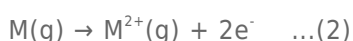
2. Given, $\Delta G^\circ = -nFE^\circ_{\text{cell}}$ and $\Delta G^\circ = -RT \ln k$. The value of $n = 2$ will be given by the slope of which line in the figure



- A. OA
- B. OB
- C. OC
- D. OD

[Answer](#)

3. Consider the following changes



The second ionization energy of M could be determined from the energy values associated with

B. $2 + 3 - 4$

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C. $1 + 3 - 9$ D. $5 - 3$

Answer

4. The ratio of slopes of $K_{\max}$ vs V and V_0 vs ν curves in the photoelectric effects gives (ν = frequency, $K_{\max}$ = maximum kinetic energy, V_0 = stopping potential)

- A. the ratio of Planck's constant of electronic charge
- B. work function
- C. Planck's constant
- D. charge of electron

Answer

5. The dissolution of $\text{Al}(\text{OH})_3$ by a solution of NaOH results in the formation of

- A. $[\text{Al}(\text{H}_2\text{O})_4(\text{OH})_2]^+$
- B. $[\text{Al}(\text{H}_2\text{O})_3(\text{OH})_3]$
- C. $[\text{Al}(\text{H}_2\text{O})_2(\text{OH})_4]^-$
- D. $[\text{Al}(\text{H}_2\text{O})_6(\text{OH})_3]$

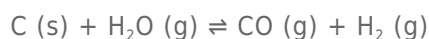
Answer

6. If the ionisation energy and electron affinity of an element are 275 and 86 kcal mol^{-1} respectively, then the electronegativity of the element on the Mulliken scale is

- A. 2.8
- B. 0.0
- C. 4.0
- D. 2.6

Answer

7. Consider the water gas equilibrium reaction,



Which of the following statements is true at equilibrium?

- A. If the amount of C(s) is increased, less water would be formed
- B. If the amount of C(s) is increased, more CO and H_2 would be formed
- C. If the pressure on the system is increased by halving the volume, more water would be formed
- D. If the pressure on the system is increased by halving the volume, more CO and H_2 would be formed

Answer

8. For the given reaction,



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The value of free energy of formation (ΔG°_f) for the ion Cl^- (aq), therefore will be

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A. $-131.2 \text{ kJ mol}^{-1}$

B. $+131.2 \text{ kJ mol}^{-1}$

C. $-262.4 \text{ kJ mol}^{-1}$

D. $+262.4 \text{ kJ mol}^{-1}$

Answer

9. The molarity of NO_3^- in the solution after 2L of 3M AgNO_3 is mixed with 3L of 1M BaCl_2 is

A. 1.2 M

B. 1.8 M

C. 0.5 M

D. 0.4 M

Answer

10. A certain metal when irradiated by light ($r = 3.2 \times 10^{16} \text{ Hz}$) emits photoelectrons with twice kinetic energy as did photoelectrons when the same metal is irradiated by light ($r = 2.0 \times 10^{16} \text{ Hz}$). The ν_0 of metal is

A. $1.2 \times 10^{14} \text{ Hz}$

B. $8 \times 10^{15} \text{ Hz}$

C. $1.2 \times 10^{16} \text{ Hz}$

D. $4 \times 10^{12} \text{ Hz}$

Answer

11. A colourless water soluble solid A on heating gives equimolar quantities of B and C. B gives dense white fumes with HCl and C does so with NH_3 . B gives brown precipitate with Nessler's reagent and C gives white precipitate with nitrates of Ag^+ , Pb^+ and Hg^+ . A is

A. NH_4Cl

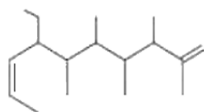
B. NH_4CO_3

C. NH_4NO_2

D. FeSO_4

Answer

12. The IUPAC name of the given compound is-



A. 4-ethyl-5,6,7,9-tetramethyldeca-2, 9-diene

B. 7-ethyl-2,4,5,6-tetramethyldeca-1, 8-diene

C. 7-ethyl-2,4,5,6-tetramethyldeca-1, 7-diene

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13. Caffeine has a molecular weight of 194 u. If it contains 28.9% by mass of nitrogen, number of atom of nitrogen in one molecular of caffeine is

A. 4
B. 6
C. 2
D. 3

Answer

14. A compound X on heating gives a colourless gas. The residue is dissolved in water to obtain Y. Excess CO_2 is passed through aqueous solution of Y when Z is formed. Z on gentle heating gives back X. The compound X is

A. $\text{Ca}(\text{HCO}_3)_2$
B. CaCO_3
C. NaHCO_3
D. Na_2CO_3

Answer

15. In benzene, the triple bond consists of

A. one sp-sp sigma bond and two p-p pi bonds
B. two sp-sp sigma bonds and one p-p pi bond
C. one $\text{sp}^2\text{-sp}^2$ sigma bond, one p-p pi bond
D. one $\text{sp}^2\text{-sp}^2$ sigma bond, one $\text{sp}^2\text{-sp}^2$ pi bond and one p-p pi bond

Answer

16. With excess of water, both P_2O_5 and PCl_5 give

A. H_3PO_3
B. H_3PO_2
C. H_3PO_4
D. $\text{H}_4\text{P}_2\text{O}_7$

Answer

17. When copper is treated with a certain concentration of nitric acid, nitric oxide and nitrogen dioxide are liberated in equal volumes according to the equation,



The coefficients of x and y are respectively

A. 2 and 3
B. 2 and 6
C. 1 and 3
D. 3 and 8

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Answer

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18. A and B respectively are
- A. Both
- B. Both
- C.
- D.

Answer

19. An alloy of copper, silver and gold is found to have copper atom constituting the ccp lattice. If silver atom occupy the edge centres and gold atom is present at body centred, the alloy has a formula

- A. $\text{Cu}_4\text{Ag}_2\text{Au}$
- B. $\text{Cu}_4\text{Ag}_4\text{Au}$
- C. $\text{Cu}_4\text{Ag}_3\text{Au}$
- D. CuAgAu

Answer

20. Which two sets of reactants best represents the amphoteric character of $\text{Zn}(\text{OH})_2$?

Set I - $\text{Zn}(\text{OH})_2(\text{s})$ and $\text{OH}^-(\text{aq})$

Set II - $\text{Zn}(\text{OH})_2(\text{s})$ and $\text{H}_2\text{O}(\text{l})$

Set III - $\text{Zn}(\text{OH})_2(\text{s})$ and $\text{H}^+(\text{aq})$

Set IV - $\text{Zn}(\text{OH})_2(\text{s})$ and $\text{NH}_3(\text{aq})$

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

Answer

21. Point out incorrect stability order

- A. $[\text{Cu}(\text{NH}_3)_4]^{2+} < [\text{Cu}(\text{en})_2]^{2+} < [\text{Cu}(\text{trien})]^{2+}$
- B. $[\text{Fe}(\text{H}_2\text{O})_6]^{3+} < [\text{Fe}(\text{NO}_2)_6]^{3-} < [\text{Fe}(\text{NH}_3)_6]^{3+}$
- C. $[\text{Co}(\text{H}_2\text{O})_6]^{3+} < [\text{Rh}(\text{H}_2\text{O})_6]^{3+} < [\text{Ir}(\text{H}_2\text{O})_6]^{3+}$
- D. $[\text{Cr}(\text{NH}_3)_6]^{3+} < [\text{Cr}(\text{NH}_3)_6]^{2+} < [\text{Cr}(\text{NH}_3)_6]^{3+}$

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minimum molecular weight of

the compound is

- A. 200
B. 400
C. 600
D. 800

Answer

23. Which one of the following is a case of negative adsorption?

- A. Acetic acid solution in contact with animal charcoal.
B. Dilute KCl solution in contact with blood charcoal.
C. Concentration KCl solution in contact with blood charcoal
D. H_2 gas in contact with charcoal at 300 K.

Answer

24. The concentrations of the reactant A in the reaction $A \rightarrow B$ at different times are given below

Concentration (M)	Time (minutes)
0.069	0
0.052	17
0.035	34
0.018	51

The rate constant of the reaction according to the correct order of the reaction is

- A. 0.001 M/min
B. 0.001 min^{-1}
C. 0.001 min/M
D. $0.001 \text{ M}^{-1} \text{ min}^{-1}$

Answer

25. Which of the following does not exist?

- A. $KI + I_2 \rightarrow KI_3$
B. $KF + F_2 \rightarrow KF_3$
C. $KBr + ICl_2 \rightarrow K[BrICl]$
D. $KF + BrF_3 \rightarrow K[BrF_4]$

Answer

26. A saturated solution of H_2S in 0.1 M HCl at $25^\circ C$ contains S^{2-} ion concentration of $10^{-23} \text{ mol L}^{-1}$.

The solubility product of some sulphides are $CuS = 10^{-44}$, $FeS = 10^{-14}$, $MnS = 10^{-15}$, $CdS = 10^{-25}$.
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If 0.01 M solution of these salts in 1M HCl are saturated with H_2S , which of these will be precipitated?

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A. All

B. All except MnS

C. All except MnS and FeS

D. Only CuS

Answer

27. The chemical composition of slag formed during the smelting process in the extraction of copper is

A. $Cu_2O + FeS$

B. $FeSiO_3$

C. $CuFeS_2$

D. $Cu_2S + FeO$

Answer

28. $X Cl_2$ (excess) + $Y Cl_2 \rightarrow X Cl_4 + Y \downarrow$

$YO \rightarrow 400^\circ C \Delta 12O_2 + Y$

Ore of Y would be

A. siderite

B. malachite

C. hornsilver

D. cinnabar

Answer

29. Amongst NO_3^- , AsO_3^{3-} , CO_3^{2-} , ClO_3^- , SO_3^{2-} and BO_3^{3-} , the non-planar species are

A. CO_3^{2-} , SO_3^{2-} and BO_3^{3-}

B. AsO_3^{3-} , ClO_3^- and SO_3^{2-}

C. NO_3^- , CO_3^{2-} and BO_3^{3-}

D. SO_3^{2-} , NO_3^- and BO_3^{3-}

Answer

30. The false statements among the following are

I. A primary carbocation is less stable than a tertiary carbocation.

II. A secondary propyl carbocation is less stable than allyl carbocation.

III. A tertiary free radical is more stable than a primary free radical.

IV. Isopropyl carbanion is more stable than ethyl carbanion.

A. I and II

B. II and III

C. I and IV

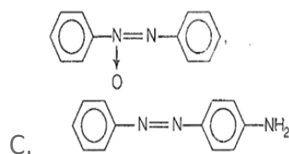
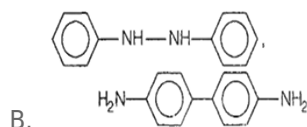
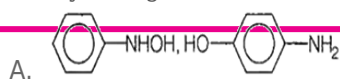
D. II and IV

Answer

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A and B respectively are

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D. None of the above

Answer

32. In keto-enol tautomerism of dicarbonyl compounds, the enol-form is preferred in contrast to the keto-form, this is due to

- A. presence of carbonyl group on each side of $-CH_2$ group
- B. resonance stabilisation of enol form
- C. presence of methylene group
- D. rapid chemical exchange

Answer

33. Which of the following sets of reactants is used for preparation of paracetamol from phenol?

- A. HNO_3 , H_2 / $Pd(CH_3CO)_2O$
- B. H_2SO_4 , H_2 / $Pd(CH_3CO)_2O$
- C. $C_6H_5N_2Cl$, $SnCl_2$ / $HCl(CH_3CO)_2O$
- D. Br_2 / H_2O , Zn / $HCl(CH_3CO)_2O$

Answer

34. A certain compound gives negative test with ninhydrin and positive test with Benedict's solution. The compound is

- A. a protein
- B. a monosaccharide
- C. a lipid
- D. an amino acid

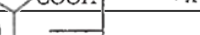
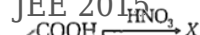
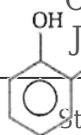
Answer

35. Super glue or crazy glue is

- A. poly (methyl methacrylate)
- B. poly (ethyl acrylate)
- C. poly (methyl -cyanoacrylate)
- D. poly (ethyl methacrylate)

Answer

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36.

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X and Y in the above given reaction are

- A. picric acid, 2,4, 6-tribromophenol
- B. 5-nitrophenol acid, 5-bromosalicylic acid
- C. o-nitrophenol, o-bromophenol
- D. 3, 5-dinitrosalicylic acid, 3,5-dibromosalicylic acid

Answer

37. In the cannizzaro reaction given below, the slowest step is



- A. the attack of OH^- at the carbonyl group
- B. the transfer of hydride ion to the carbonyl group
- C. the abstraction of a proton from the carboxylic acid
- D. the deprotonation of $\text{Ph} - \text{CH}_2\text{OH}$

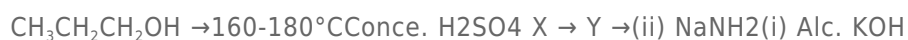
Answer

38. The reaction of 1-bromo-3-chlorocyclobutane with metallic sodium in dioxane under reflux conditions gives

- A.
- B.
- C.
- D.

Answer

39. Identify Z in the following reaction sequence



- A. $\text{CH}_3\text{-CH(NH}_2\text{)-CN}_2\text{NH}_2$
- B. $\text{CH}_3\text{-CHOH-CH}_2\text{OH}$
- C. $\text{CH}_3\text{-C(OH)=CH}_2$
- D. $\text{CH}_3\text{-C}\equiv\text{CH}$

Answer

40. Which of the following reactions is used to prepare isobutane?

- A. Wurtz reaction of $\text{C}_2\text{H}_5\text{Br}$
- B. Hydrolysis of n-butylmagnesium iodide
- C. Reduction of propanol with red phosphorus and HI
- D. Decarboxylation of 3-methylbutanoic acid

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