



Chemistry

- (a) What volume of 0.100 M AgNO_3 should be added to 10.0 ml of 0.090 M $\text{K}_2\text{Cr}_2\text{O}_4$ to precipitate all the chromate as $\text{Ag}_2\text{Cr}_2\text{O}_4$?

(b) What is to be done in order to prepare 0.40 M NaCl starting with 100 ml of 0.030 M NaCl ? (mol. Wt. of NaCl=58.5)

(c) For complete oxidation 60 ml of a ferrous sulphate solution with KMnO_4 in acid medium the amount of 0.01 M $\text{K}_2\text{Cr}_2\text{O}_7$ required for the same oxidation.

(d) An aqueous solution is 0.01 M CH_3OH . The concentration of the solution is very nearly equal to ...
- (a) 6.02×10^{23} oxygen molecules are present at -13°C in a 1500 ml vessel. What would be the pressure of the gas? (Avogadro's number = 6.02×10^{23} , $R = 0.082$ lit atom $\text{mol}^{-1}\text{K}^{-1}$)

(b) What is the number of moles of $\text{Fe}(\text{OH})_3$ that can be produced by allowing 2.0 mol. Fe_2S_3 4.0 mol H_2O and 6.0 mol. O_2 to react?
 $\text{Fe}_2\text{S}_3 + \text{H}_2\text{O} + \text{O}_2 \rightarrow \text{Fe}(\text{OH})_3 + \text{S}$ (no balanced)

(i) Write the ground state electronic configuration of Fe^{2+} ion (at. No. of Fe = 26)
- (a) Write the sets of quantum numbers for a 4d electron

(b) Write correct 5 electron orbital diagram

(c) After the emission of an α - particle from the atom ${}_{92}\text{U}^{238}$ what is the number of neutrons left in the atom?

(d) After an hour the amount of a certain radioactive substance disintegrated was $15/16^{\text{th}}$ of the original amount. What is the half life of radioactive substance?

(e) Out of P-F, F-F, S-F and Cl-F bonds, which bond is the least ionic?
- (a) out of SiO_2 (s), Si (s) , NaCl (s) and Br_2 (L) which is the best electrical conductor.

(b) Which of the following reaction do not involve oxidation reduction?

(i) $2\text{Rb} + 2 \text{H}_2\text{O} \rightarrow 2\text{RbOH} + \text{H}_2$

(ii) $\text{NH}_4\text{Cl} + \text{NaOH} \rightarrow \text{NaCl} + \text{NH}_3 + \text{H}_2\text{O}$

(iii) $2\text{CuI} \rightarrow 2\text{CuI} + \text{I}_2$

(iv) $4\text{KCN} + \text{Fe}(\text{CN})_2 \rightarrow \text{K}_4[\text{Fe}(\text{CN})_6]$

(c) Balance the following equation
 $\text{CH}_3\text{CHO} + \text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 \rightarrow \text{CH}_3\text{COOH} + \text{Cr}_2(\text{SO}_4)_3 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$

(d) Which of the following are not Lewis bases?

(i) Ag^+ (ii) H_2O (iii) CN^- (iv) CH_4

(e) Which anion is the weakest base?

(i) $\text{C}_2\text{H}_5\text{O}^-$ (ii) NO_3^- (iii) F^- (iv) CH_2COO^-
- (a) A 100 W, 200 V incandescent lamp is connected in series with an electrolytic cell containing copper sulphate solution. What weight of copper will be deposited by the current flowing for 5 hours? (at. Wt. of Cu = 63.54)

(b) In a reversible reaction two substances are in equilibrium. If the concentration of each one is doubled the equilibrium constant will be



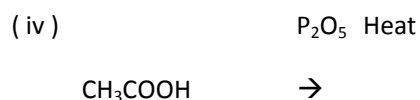
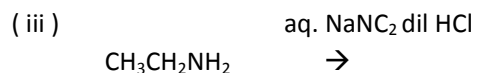
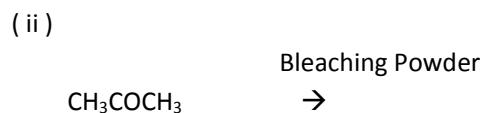
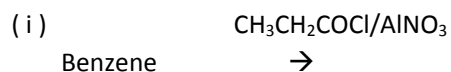
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- (c) When $[N_2O] = 0.22 \text{ M}$, the rate of decomposition of N_2O_5 is $1.3 \times 10^{-4} \text{ mol lit}^{-1}\text{s}^{-1}$. What is the value of K for the first order reaction?
6. (a) Which of the following statements is correct regarding the slag obtained during the extraction of a metal like copper or iron
- (i) the slag lighter and lower melting than the metal
 - (ii) the slag is heavier and lower melting than the metal
 - (iii) the higher melting than the metal
 - (iv) the slag is heavier and higher melting than the metal
- (b) Out of F, Cl, Br and I which has the highest electron affinity?
- (c) In which of the following compounds does the ratio of anion size to cation size have lowest value?
- (i) NaCl (ii) KCl (iii) $MgCl_2$ (iv) NaBr
- (d) To which block (s, p, d or f) does the element with atomic number 50 belong?
- (e) Out of Al, Zn, Mg and Fe which is the densest element ?
7. (a) Which of the following has the maximum number of unpaired electrons?
- (i) Zn (ii) Fe^+ (iii) Ni^{+3} (iv) Cu^+
- (b) Give complete equations for the following equations need not be balanced:
- (i) Concentrated hydrochloric acid is reacted with potassium permanganate.
 - (ii) Phosphorus is reacted with aqueous sodium hydroxide producing phosphine.
 - (iii) Iodine is produced from sodium iodide using sodium bisulphate.
 - (iv) Aluminium powder reacts with sodium nitrate in presence of excess of sodium hydroxide.
8. (a) Arrange the following as stated :
- (i) F_3 , N_2 , O_2 , Cl_2 in order of their increasing bond strength.
 - (ii) ZnO, MgO, P_4O_5 , SO_3 in order of increasing acidic property.
 - (iii) Gasoline, kerosene and diesel in order of increasing volatility.
- (b) Write down the IUPAC name of the compound
- $$H_2C=CH-CH(CH_3)_2$$
- (c) A compound is formed by substitution of two chlorine atoms for two H-atoms in propane. What is the number of structural isomers possible?
9. (a) Which of the following cannot reduce Fehling's solution?
- (i) Formic acid (ii) acetic acid (iii) formaldehyde (iv) acetaldehyde



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(b) Write down the structure of the main product of each of the following :



10. (a) Which of the following is not a mixture of hydrocarbons?

(i) candle wax (ii) kerosene (iii) vegetable oil (iv) paraffin oil.

(b) State whether following statements are true or false :

(i) Phenol is a weaker acid than carbonic acid.

(ii) Aniline is a stronger base than ammonia.

(iii) Formic acid is a weaker acid than acetic acid.

(iv) Both formaldehyde and acetaldehyde give the halo form test.

(v) The reagent $\text{Ag}(\text{NH}_3)_2^+$ can distinguish between ethylene and acetylene.

(vi) Acetylene is more acidic than thylene.

(vii) Acetaldehyde can be prepared by distillation of calcium acetate.

(viii) Diethyl ether does not react with sodium.