ET-105(B)

00613

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2012

ET-105(B) : CHEMISTRY

Time : 3 hours   *Maximum Marks : 70*

Note :   *Question no. 1 is **compulsory**. Attempt **any five** questions from question numbered from 2 to 11. Use of calculator is **allowed**.*
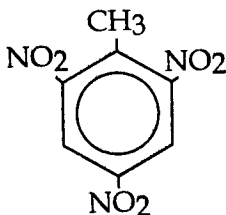
1.   (a)   For titration between $KMnO_4$ and oxalic   3
             acid in acid medium, the indicator used
             is :

      (i) $K_3Fe(CN)_6$

      (ii)   Phenolphthalein

      (iii) Methyl red

      (iv)   None of these

      (b)   An acidic solution, containing Cu^{++} ions   3
             and Zn^{++} ions, H_2S is passed, Cu^{++} ions
             precipitate as CuS but Zn^{++} ions do not.
             This is due to :

      (i)   low concentration of sulphide ions

      (ii)   high concentration of sulphide ions

      (iii) formation of a soluble complex

      (iv)   low solubility product of ZnS

(c) The equivalent weight of $KMnO_4$ in the following reaction : **3**

$2KMnO_4 + 10FeSO_4 + 8H_2SO_4 \rightarrow$
$K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8H_2O$ is ;
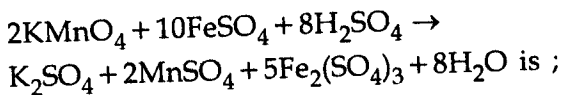
(i)   158   (ii)   79

(iii) 31.6   (iv) 63.2

(Mol.wt.of $KMnO_4 = 158$)

(d) The molecule is called : **3**

(i)   o, m, p-toluene

(ii) Nitrobenzene

(iii) 2, 4, 6 - trinitro toluene

(iv) Methyl nitrobenzene

(e) Glass is : **3**

(i)   a crystalline solid

(ii) having a sharp melting point

(iii) a polycrystalline solid

(iv) a supercooled liquid

(f) The metal which can be purified by Mond's process is : **3**

(i)   Ni   (ii)   Cu

(iii) Al (iv) All of these

(g) Teflon is a polymer. Each Polymer contains :   **3**

    (i)   one chlorine atom

    (ii) four fluorine atoms

    (iii) two chlorine atoms

    (iv) two chlorine and two fluorine atoms

(h) Which one of the following ionic species has   **3**
the least ionic radius ?

    (i) F^- (ii) Na^+

    (iii) Mg^{2+} (iv) N^{3-}

(i) The rate constant, k, of a chemical reaction   **3**
has the unit sec^{-1}. The order of reaction
is :

    (i)   0   (ii) $1\frac{1}{2}$

    (iii) 1   (iv) -1

(j) The atomic number of an element is 52. It is   **3**
an element of :

    (i)   s-block   (ii) p-block

    (iii) d-block   (iv) f-block

2. In the unit cells of SC, BCC and FCC the shortest **8** distance between two lattice atoms is respectively : ('a' is lattice parameter)

   (i) $a\sqrt{2}/2$, a, $a\sqrt{3}/2$

   (ii) $a\sqrt{3}/2$, a, $a\sqrt{2}/2$

   (iii) $a\sqrt{3}/2$, $a\sqrt{2}/2$, a

   (iv) a, $a\sqrt{3}/2$, $a\sqrt{2}/2$

3. (a) Arrange the following acids according to **4 , 4** their increasing order of acidity : $CH_2ClCOOH$, CH_3COOH, Cl_3CCOOH and $CHCl_2COOH$

   (b) Between $\dot{N}H_3$ and $C_6H_5\dot{N}H_2$, which is more basic and why ?

4. (a) What is a Zwitter ion ? Give one example.

   (b) In amino acids $-NH_2$ group is attached **2, 2, 2, 2** to :

   (i) α - carbon atom

   (ii) β - carbon atom

   (iii) γ - carbon atom

   (iv) none of these

(c) Which reagent is used for the test of an amino acid ?

(d) The number of essential amino acid as :
(i) 10 (ii) 15 (iii) 20 (iv) 25

5. (a) Which one of the following electronic configuration corresponds to d-block element ?   **4, 4**
(i) $ns^2 np^6 nd^{1-10}$
(ii) $(n-1) d^{1-10} ns^2$
(iii) $(n-1) d^{1-10} ns^2 np^6$
(iv) $(n-1) d^{1-10} ns^2 np^1$

(b) How many grams of sulphuric acid is required to produce 20 g hydrogen ? (At. wt. $S-32$, $O=16$)

6. (a) Find the ratio of diffusion rates of hydrogen and oxygen gas under same conditions.   **4, 4**

(b) Nitrogen has higher ionisation energy than oxygen. Explain.

7. (a) Three elements A, B and C have atomic numbers 17, 18 and 20 respectively. State :   **5, 3**
(i) Which is an inert element ?
(ii) Which has the highest electro negativity ? What will be the formula of the compound formed by A and C ?

(b) Write down van der Waals equation for 1 mole of a gas and hence deduce the same for 'n' mole of a gas.

8. (a) Which one of the following molecules has the lowest bond angle ?   **2, 2, 2, 2**

(i) CH_4 (ii) H_2O

(iii) C_2H_2 (iv) NH_3

(b) The vapour density of CO_2 is :

(i)   22   (ii) 22 g cm^{-1}

(iii) $22g \text{ L}^{-1}$

(c) Name two important pesticides.

(d) What is smog ?

9. (a) A metal wire carries a current of **4, 4** 1 ampere. How many electrons pass a point in the wire in 1 second ? (1 Faraday = 96500 coulomb)
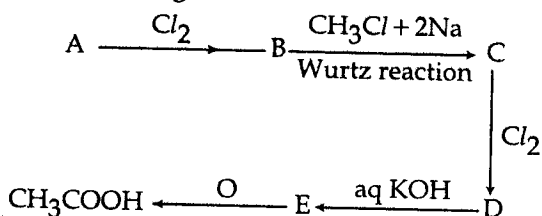
(b) What are the coordination number and oxidation number of the central metal ion in the following ?

(i) $\left[Cu(NH_3)_4\right]^{2+}$

(ii) $\left[Fe(CN)_6\right]^{3-}$

10. (a) Mention two differences between 4, 4 hydrophilic and hydrophobic colloids.

(b) Give one example each with equation of :
(i) Oxidising property of carbon dioxide
(ii) Reducing property of hydrogen peroxide.

11. (a) Identify the compounds A, B, C, D and E in 6, 2 the following transformation :

$$A \xrightarrow{Cl_2} B \xrightarrow[\text{Wurtz reaction}]{CH_3Cl + 2Na} C$$

$$\Big\downarrow Cl_2$$

$$CH_3COOH \xleftarrow{O} E \xleftarrow{\text{aq KOH}} D$$

(b) If E_a of a reaction is zero, k is equal to :
(i) Infinity
(ii) A (frequency factor)
(iii) zero
(iv) A^{-1}(frequency factor)$^{-1}$

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