

A LEVEL CHEMISTRY PAPER 3 2007 MEETLEARN.COM

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*Advanced Level
Chemistry*

1. (a) Draw a well labelled Bom-Haber cycle for the formation of one mole of magnesium oxide (solid) identifying all the standard energy changes involved.
 (b) Describe any experimental set-up that could be used to determine any one of the named energy changes in (a) above.
 (c) Calculate the standard enthalpy of solution of sodium chloride, given that, the lattice energy is -784 KJ mol^{-1} and that the hydration energy is -783 KJ mol^{-1} .
2. (a) State Raoult's law as applied to miscible liquids.
 (b) Write short notes on the following:
 - (i) Distillation methods (simple, steam, fractional)
 - (ii) The concept of dynamic equilibrium
 - (iii) Miscible liquid mixture
 - (iv) Distribution of a solute between two immiscible liquids
3. (a) Using suitable examples, write short notes on the following:
 - (i) Electrophilic substitution reaction
 - (ii) Electrophilic addition reaction
 - (iii) Free radical reaction
 (c) One compound A, C^nEC gives a bromo alkane when treated with hydrogen bromide. Another compound, B, $\text{C}_4\text{H}_9\text{Br}$ gives a cyano alkane when treated with warm potassium cyanide in propanone. Identify each of the compounds A and B, giving their structures. Name the products and explain the reactions.
- (a) Describe how ethanoic acid (acetic acid) can be obtained from each of the following starting materials, explaining how the acid is purified (give reagents and reaction conditions).
 - (i) Ethylethanoate
 - (ii) Ethanal
 (b) How can the following compounds be obtained from propanoic acid?
 - (i) propanoyl chloride
 - (ii) 1-iodo propanoic acid
 - (iii) propanamide
 (c) Explain the following facts:
 - (i) The melting point of aminoethanoic acid is 262°C while that of chloroethanoic acid is 63.1°C
 - (ii) An aqueous solution of aminoethanoic acid is neutral while that of chloroethanoic acid is acidic.
5. (a) Differentiate between d-block metals and transition metals, illustrating the differences with suitable examples.
 (b) Discuss the following properties of transition metals, using suitable examples.
 - (i) Isomerism in their compounds
 - (ii) Variable oxidation state
 - (iii) Atomic radius
 - (iv) Catalytic activity
 - (v) Formation of complexes
 (c) Describe what is observed when anhydrous iron(II) sulphate, FeSO_4 , is dissolved in excess ammonia.
 (d) Draw the structure of the complex ion formed in (c) above, indicating clearly:

- (i) the bonds
(ii) the charge
(iii) The coordination number and oxidation state of the central metal. Also give the formula and name of the complex ion. j^{\wedge}

6. Answer the following questions with reference to the group VII (17) elements (the halogens).

Give the names and symbols of the elements, and discuss the trends in physical state of the elements at room temperature.

- (a) Write briefly, using suitable examples, on:
(i) Disproportionation reactions
(ii) Variable oxidation states
(iii) Oxidising agents
(iv) Bonding and acidity of the hydrogen halides
(v) Extraction of the elements

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