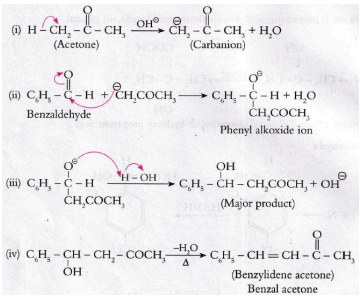
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Answers Key:

ANSWER THE FOLLOWING

1. **(i) Gangue:** The ores are associated with nonmetallic impurities, rocky materials and siliceous matter which are collectively known as gangue.
   Eg: SiO_2 is the gangue present in the iron ore (Fe_2O_3)
   (ii) Slag: In the smelting process, a flux combines with Silica gangue forming slag.
   $CaO_{(s)} + SiO_{2(s)} \rightarrow CaSiO_{3(s)}$
   Flux + gangue → Slag
2. (i) Silicones are used for low temperature lubrication and in vacuum pumps, high temperature oil baths etc.
   (ii) They are used for making water proofing clothes.
   (iii) They are used as insulting material in electrical motor and other appliances.
   (iv) They are mixed with paints and enamels to make them resistant towards high temperature, sunlight, dampness and chemicals.
3. (i) Its small size
   (ii) Its high electronegativity
   (iii) Its high ionisation energy
   (iv) Non-availability of d-orbital in the valence shell.
   (v) Rather inert
   (vi) High bond energy
4. (i) The first transition metal Scandium exhibits only +3 oxidation state, but all other transition elements exhibit variable oxidation states by loosing electrons from (n-1)d orbital and ns orbital as the energy difference between them is very small. At the beginning of the series, +3 oxidation state is stable but towards the end +2 oxidation state becomes stable. The first and last elements show less number of oxidation states and the middle elements with more number of oxidation states
   (ii) For example, the first element Sc has only one oxidation state +3; the middle element Mn has six different oxidation states from +2 to +7. The last element Cu shows +1 and +2 oxidation states only.
5. 

ANSWER THE FOLLOWING

6. (i) The extraction of metals from their oxides can be carried out by using different reducing agents.
   (ii) Consider the following reaction
   $\frac{2}{y}M_xO_{y(s)} \rightarrow \frac{2x}{y}M_{(s)} + O_{2(g)}$ (1)
   (iii) The above reduction may be carried out with carbon. In this case the reducing agent carbon may be oxidized to either CO or CO_2
   $C + O_2 \rightarrow CO_{2(g)}$ (2)
   $2C + O_2 \rightarrow 2CO_{(g)}$ (3)
   (iv) If CO is used as a reducing agent
   $2CO + O_2 \rightarrow 2CO_{2(g)}$ (4)
   (v) A suitable reducing agent is selected based on the thermodynamics considerations.
   (vi) We know that for a spontaneous reaction, the change in free energy (△G) should be negative.
   (vii) Therefore, thermodynamically, the reduction of metal oxide with a given reducing agent can occur if the free energy change for the coupled reaction is negative.
   (viii) Hence, the reducing agent is selected in such a way that it provides a large negative △G value for the coupled reaction.
7. When boric acid or borate salt is heated with ethyl alcohol in presence of conc. sulphuric acid, an ester, trialkylboranes is formed.
   The vapour of this ester burns with a green edged flame
   This reaction is used to identify the presence of triethyl borate.
   $H_3BO_3 + 3C_2H_5OH \xrightarrow[H_2SO_4]{Conc} B(OC_2H_5)_3 + 3H_2O$
   Ethyl borate
   (Green edged flame)
8. (i) Transition metals have number of unpaired electron. They are involved in metallic bonding. Hence they show high melting point.
   (ii) As we move from left to right along the transition metal series melting point first increases reach a maximum value and then decreases as the d-electrons pair up and become less available for bonding.

9. 1. Photochemical reaction between H_2 and Cl_2 ; $H_{2(g)} + Cl_{2(g)} \xrightarrow{h\nu} 2HCl_{(g)}$
   2. Decomposition of N_2O on hot platinum surface $N_2O_{(g)} \rightleftharpoons N_{2(g)} + \frac{1}{2}O_{2(g)}$

10. i) O_2N–C$_6$H$_4$–$Br + CH_3ONa$

    ii) O_2N–C$_6$H$_4$–$ONa + CH_3Br$

    O_2N–C$_6$H$_4$–$ONa + CH_3Br \rightarrow O_2N$–C$_6H_4$–$OCH_3 + NaBr$

    1 - methoxy – 4 nitro benzene

CHOOSE THE CORRET ANSWER

11. (d) In the metallurgy of gold, the metal is leached with dilute sodium chloride solution
12. (c) $Cu(NO_3)_2$ and NO_2
13. (a) Al < Ga < In < Tl
14. T_1= 200 K ; k = k_1
    T_2 =400 K ; k_1 = k_2 = 2k_1
    $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$
    $\log \left[\frac{2k_1}{k_1}\right]$
    $= \left[\frac{E_a}{2.303 \times 8.314 JK^{-1}mol^{-1}}\right]$
    $= \left[\frac{400k - 200K}{200k \times 400k}\right]$
    $E_a = \frac{0.3010 \times 2.303 \times 8.314 JK^{-1}mol^{-1} \times 200K \times 400K}{200K}$
    E_a = 2305 J mol^{-1}
    E_a = 2.305 kJ mol^{-1}
15. (a) Phenol

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