Quiz (Application of Reactivity Series)

1. Some information about the extraction methods of five different metals *A*, *B*, *C*, *D* and *E* is listed as follows:

Metal	Extraction method
A	Mechanical separation
B	Carbon reduction
C	Electrolysis
D	Displacement from solution by metal *E*
E	Heating the metal ore in air

Arrange the positions of the above metals in the metal reactivity series based on their extraction methods, from the lowest to the highest. Explain your answer.

2. The following table shows the results of some experiments on metals *X*, *Y* and *Z*, and their oxides.

Experiment	*X*	*Y*	*Z*
Reaction with cold water	No observable change	Colourless gas given out	No observable change
Reaction with copper(II) nitrate solution	Reddish brown solid formed	Colourless gas given out and a reddish brown solid formed	No observable change
Heating metal oxide with carbon powder	Silvery solid formed	No observable change	Reddish brown solid formed

(a) What is the colourless gas formed when *Y* is added to cold water?

(b) Name the type of reaction that occurs when *X* is added to copper(II) nitrate solution.

(c) Suggest what metal *Z* could be.

(d) Write a chemical equation for the reaction when the oxide of metal *Z* is heated with carbon powder.

(e) Arrange the three metals in order of increasing reactivity. Explain your answer.

Suggested Answer

1. Mechanical separation is the easiest way to extract a metal from its ore. Thus, metal *A* must be the least reactive.

   Metal *D* should be in a position higher than that of *A*, but lower than that of *E* as it can be displaced out from its solution by *E*.

   Metal *C* should be in the highest position among the five metals because it requires electrolysis for extraction. It is the most difficult to be extracted.

   Metal *B* should be in a position higher than that of *E* since it is extracted by carbon reduction.

   ∴ The positions of the above five metals in the metal reactivity series should be: $A < D < E < B < C$

2. (a) Hydrogen

   (b) Displacement reaction

   (c) Copper

   (d) $2ZO(s) + C(s) \longrightarrow 2Z(s) + CO_2(g)$
   OR $2CuO(s) + C(s) \longrightarrow 2Cu(s) + CO_2(g)$

   (e) *Z*, *X*, *Y*. *Y* is the most reactive among the three metals because only it can react with cold water. *X* is more reactive than *Z* because it can displace copper metal from copper(II) sulphate solution, but *Z* cannot.