

CHEM 0011 Reaction Worksheet:

For the following reaction, predict:

- (i) Whether a reaction will occur, if so, do (ii) to (vii).
  - (ii) What type of reaction is it?
  - (iii) Write the balanced chemical reaction.
  - (iv) Write the net ionic reaction.
  - (v) Identify the spectator ion(s).
  - (vi) Identify the species oxidized.
  - (vii) Identify the species reduced.
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1. Copper is brought into contact with a silver nitrate solution.

- (i) Yes
- (ii) Single Replacement reaction involving metals
- (iii)  $\text{Cu (s)} + 2 \text{AgNO}_3 \text{ (aq)} \rightarrow 2 \text{Ag (s)} + \text{Cu(NO}_3)_2 \text{ (aq)}$
- (iv)  $\text{Cu (s)} + 2 \text{Ag}^+ \text{ (aq)} \rightarrow 2 \text{Ag (s)} + \text{Cu}^{+2} \text{ (aq)}$
- (v)  $\text{NO}_3^- \text{ (aq)}$
- (vi)  $\text{Cu (s)}$
- (vii)  $\text{Ag}^+ \text{ (aq)}$

2. Liquid bromine is brought into contact with a sodium chloride solution.

No reaction

3. Calcium is brought into contact with water.

- (i) Yes
- (ii) Single Replacement reaction involving metals
- (iii)  $\text{Ca (s)} + \text{H}_2\text{O (l)} \rightarrow \text{Ca(OH)}_2 \text{ (aq)} + \text{H}_2 \text{ (g)}$
- (iv)  $\text{Ca (s)} + \text{H}_2\text{O (l)} \rightarrow \text{Ca}^{+2} \text{ (aq)} + 2 \text{OH}^- \text{ (aq)} + \text{H}_2 \text{ (g)}$
- (v) No spectator ion
- (vi)  $\text{Ca (s)}$
- (vii)  $\text{H}^+ \text{ (aq)}$  in water (Note: Oxygen in this reaction remained -2 before and after the reaction).

4. Chlorine gas is brought into contact with a sodium bromide solution.

- (i) Yes
- (ii) Single Replacement reaction involving halogens
- (iii)  $\text{Cl}_2 (\text{g}) + 2 \text{NaBr} (\text{aq}) \rightarrow \text{Br}_2 (\text{aq}) + 2 \text{NaCl} (\text{aq})$
- (iv)  $\text{Cl}_2 (\text{g}) + 2 \text{Br}^- (\text{aq}) \rightarrow \text{Br}_2 (\text{aq}) + 2 \text{Cl}^- (\text{aq})$
- (v)  $\text{Na}^+ (\text{aq})$
- (vi)  $\text{Br}^- (\text{aq})$
- (vii)  $\text{Cl}_2 (\text{g})$

5. An aqueous solution of iodine is brought into contact with a sodium bromide solution.

No reaction

6. Iron is brought into contact with a copper (II) nitrate solution.

- (i) Yes
- (ii) Single Replacement reaction involving metals
- (iii)  $\text{Fe} (\text{s}) + \text{Cu}(\text{NO}_3)_2 (\text{aq}) \rightarrow \text{Cu} (\text{s}) + \text{Fe}(\text{NO}_3)_2 (\text{aq})$
- (iv)  $\text{Fe} (\text{s}) + \text{Cu}^{+2} (\text{aq}) \rightarrow \text{Cu} (\text{s}) + \text{Fe}^{+2} (\text{aq})$
- (v)  $\text{NO}_3^- (\text{aq})$
- (vi)  $\text{Fe} (\text{s})$
- (vii)  $\text{Cu}^{+2} (\text{aq})$

7. Liquid bromine is brought into contact with a sodium iodide solution.

- (i) Yes
- (ii) Single Replacement reaction involving halogens
- (iii)  $\text{Br}_2 (\text{l}) + 2 \text{NaI} (\text{aq}) \rightarrow \text{I}_2 (\text{aq}) + 2 \text{NaBr} (\text{aq})$
- (iv)  $\text{Br}_2 (\text{l}) + 2 \text{I}^- (\text{aq}) \rightarrow \text{I}_2 (\text{aq}) + 2 \text{Br}^- (\text{aq})$
- (v)  $\text{Na}^+ (\text{aq})$
- (vi)  $\text{I}^- (\text{aq})$
- (vii)  $\text{Br}_2 (\text{l})$

8. Zinc is brought into contact with hydrochloric acid.

- (i) Yes
- (ii) Single Replacement reaction involving metals
- (iii)  $\text{Zn} (\text{s}) + 2 \text{HCl} (\text{aq}) \rightarrow \text{ZnCl}_2 (\text{aq}) + \text{H}_2 (\text{g})$
- (iv)  $\text{Zn} (\text{s}) + 2 \text{H}^+ (\text{aq}) \rightarrow \text{Zn}^{+2} (\text{aq}) + \text{H}_2 (\text{g})$
- (v)  $\text{Cl}^- (\text{aq})$
- (vi)  $\text{Zn} (\text{s})$
- (vii)  $\text{H}^+ (\text{aq})$

9. An aqueous solution of iodine is brought into contact with a sodium chloride solution.

No reaction

10. Chlorine gas is brought into contact with a sodium iodide solution.

(i) Yes

(ii) Single Replacement reaction involving halogens

(iii)  $\text{Cl}_2 (\text{g}) + 2 \text{NaI} (\text{aq}) \rightarrow \text{I}_2 (\text{aq}) + 2 \text{NaCl} (\text{aq})$

(iv)  $\text{Cl}_2 (\text{g}) + 2 \text{I}^- (\text{aq}) \rightarrow \text{I}_2 (\text{aq}) + 2 \text{Cl}^- (\text{aq})$

(v)  $\text{Na}^+ (\text{aq})$

(vi)  $\text{I}^- (\text{aq})$

(vii)  $\text{Cl}_2 (\text{g})$