



Year 12 Chemistry
Tutorial 9.5.F – Sodium Carbonate

Module 9.5 – Industrial Chemistry

Topic 9.5.F – Sodium Carbonate

Name

Date

1. Answer True or False to the following statements:

- a) Brine solutions must be free of sulfate ions.
- b) Lime is derived from the thermal decomposition of calcium carbonate.
- c) Ammonia for the Solvay process comes from the Contact process.
- d) Calcium chloride is an end product of the Solvay process.
- e) Sodium carbonate can be obtained by the direct reaction of calcium carbonate and sodium chloride.

2. Calculate the theoretical mass of sodium carbonate that can be obtained from 2 tonnes of calcium carbonate.

.....
.....
.....
.....

3. Sodium hydrogen carbonate is a by-product of the Solvay process. It is used in baking soda. Use an equation to show why sodium hydrogen carbonate is used in baking soda.

.....

4. Anhydrous sodium carbonate can be converted to washing soda (sodium carbonate decahydrate) by crystallisation of an aqueous solution.

- a) Calculate the mass of washing soda that can be made from 1 kg of sodium carbonate.

.....
.....
.....

b) Washing soda crystals are efflorescent. When exposed to air, they lose their water to form carbonate monohydrate. Write a balanced equation for this efflorescence.

.....

5. The ammonia saturator tower consists of descending brine flowing over partitions and ascending ammonia gas.

a) Why is the brine made to flow over partitions?

.....
.....
.....

b) Why must the tower be cooled by cold water?

.....
.....
.....

6. One step in the Solvay process involves a neutralisation reaction.

a) Where does this step occur?

.....
.....
.....

b) Write a balanced equation for the neutralisation reaction.

.....

c) Explain how this reaction can be driven to the right.

.....
.....
.....

7. The ammonia used in the Solvay process needs to be recovered and recycled.

a) Why is this necessary?

.....
.....
.....

b) Explain the chemistry behind the recovery of ammonia.

.....
.....
.....