

GCSE Chemistry A (Gateway Science)
J248/02 C4-C6 and C7 Foundation (Foundation Tier)

Question Set 6

1 Ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$, is a fertiliser.

Ammonium sulfate can be manufactured from ammonia and sulfuric acid.

(a) Sulfuric acid is manufactured in a series of steps.

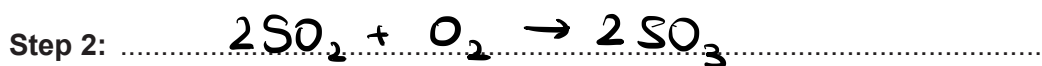
Step 1: Sulfur is burnt in oxygen to produce sulfur dioxide.

Step 2: The Contact Process:

Sulfur dioxide is reacted with oxygen to produce sulfur trioxide. This takes place in the presence of a vanadium(V) oxide catalyst at a pressure of 2 atmospheres and at about 450°C .

Step 3: Sulfur trioxide is reacted with water to produce sulfuric acid.

Write balanced symbol equations for each step of this process.



(b) Ammonium sulfate is a salt.

It is manufactured using the reaction between the alkali ammonia and sulfuric acid.



What type of reaction is this?

neutralisation [1]

(c) A sample containing 17.0 g of ammonia completely reacts with sulfuric acid. A mass of 66.0 g of ammonium sulfate is made.

Show that the maximum mass of ammonium sulfate that can be made from 51.0 g of ammonia is 198.0 g.

$$17 : 66 = 51 : 198.0 \quad \therefore \text{NH}_4 = 198.0 \text{ g}$$

$\underbrace{\quad}_{\times 3.88} \quad \quad \quad \underbrace{\quad}_{\times 3.88}$

[1]

(d) A student has a solution of ammonium sulfate.

Describe how he can obtain a pure dry sample of ammonium sulfate.

Evaporate off the water from the solution by heating the solution over a steam bath slowly then let it cool down and crystallise. [1]

Total Marks for Question Set 6: 7

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