

## Chemguide – questions

### PERIOD 3: ACID-BASE REACTIONS OF THE OXIDES

1. Answer the following questions by considering only the highest oxides of the Period 3 elements:

Na<sub>2</sub>O      MgO      Al<sub>2</sub>O<sub>3</sub>      SiO<sub>2</sub>      P<sub>4</sub>O<sub>10</sub>      SO<sub>3</sub>      Cl<sub>2</sub>O<sub>7</sub>

a) (i) Which is the most basic oxide?

(ii) What is it about this oxide which makes it basic?

(iii) Write an equation to show its reaction with dilute hydrochloric acid.

(iv) Write an equation to show its reaction with water.

b) (i) Which is the next most basic oxide?

(ii) Why is it less basic than the one you have described in part (a)?

c) (i) Name an amphoteric oxide.

(ii) Explain what the term *amphoteric* means. Your answer should include one or more equations as necessary, relating to the reactions of the oxide you have named.

d) The acidic oxides are often thought of in terms of the strengths of the acids formed when they react with water.

(i) Write the equations for the reactions of SO<sub>3</sub> and P<sub>4</sub>O<sub>10</sub> with water.

(ii) Which of the two acids that you have produced in part (i) is the stronger? Draw the structures for the two acids, and use these to help to explain why that acid is stronger.

(iii) SO<sub>3</sub> can also act as an acid in its own right by reacting with a base. Write an equation to show it reacting with a base.

2. Choose one of the oxides P<sub>4</sub>O<sub>6</sub> or Cl<sub>2</sub>O.

a) Draw its structure.

b) Write an equation to show its reaction with water, and draw the structure of the product.

c) Is the product of that reaction a strong base, a weak base, amphoteric, a weak acid or a strong acid?