General Certificate of Education
Advanced Level Examination
June 2010

# Chemistry CHM6T/Q10/task

## Unit 6T A2 Investigative Skills Assignment

## Task Sheet

### The investigation of a rust remover

Ethanedioic acid is used in the automotive industry to remove rust from steel. Ethanedioic acid is a white crystalline solid at room temperature. Ethanedioic acid can be supplied in the form of the anhydrous compound $H_2C_2O_4$ or as the dihydrate $H_2C_2O_4.2H_2O$

You are asked to identify the form of the acid in the rust remover. The determination of the $M_r$ of the acid is a first step in this identification.

You are provided with an aqueous solution which contains a known mass of the rust remover. Titrate this solution with the 0.0200 mol $dm^{-3}$ solution of potassium manganate(VII) provided.

**Wear eye protection at all times.**

**For the purpose of this task assume that all of the solutions are toxic and corrosive.**

### Procedure

1. Rinse the burette with the potassium manganate(VII) solution. Set up the burette and, using a funnel, fill it with the potassium manganate(VII) solution. Record the initial burette reading in a table of your own design on the Candidate Results Sheet.
2. Using a pipette filler, rinse the pipette with the rust remover solution provided. Using this pipette, transfer 25.0 $cm^3$ of the rust remover solution to a 250 $cm^3$ conical flask.
3. Using a measuring cylinder, transfer approximately 25 $cm^3$ of dilute sulfuric acid to the conical flask.
4. Heat the conical flask until the temperature of the mixture in the flask is about 60 ºC. Remove the flask from the source of heat. You should use the method to hold the hot flask demonstrated by your teacher.
5. Remove the thermometer, rinsing any solution on the thermometer into the conical flask using the minimum amount of distilled or de-ionised water.
6. Add approximately 10 $cm^3$ of the potassium manganate(VII) solution from the burette. Swirl the mixture and wait until it becomes colourless.
7. Continue to add the potassium manganate(VII) solution until the mixture in the conical flask just turns pink. Record your final burette reading in your table.
8. Rinse the conical flask with distilled or de-ionised water and repeat the titration until you obtain a minimum of **two** titres which are concordant. (You should do no more than five titrations.) **Have one of your final burette readings checked by your teacher.**
9. Calculate and record the average titre on the Candidate Results Sheet. Indicate clearly the titres you used in calculating this average titre.

**ISA CHM6T/Q10 Candidate Results Sheet**

Centre Number | | | | | | Teacher Group .....

Candidate Name ..... Candidate number | | | | |

**Results**

Record your titration results in an appropriate table in the space below.

Average titre / $cm^3$ .....

| For Teacher's use only | | | | | |
|---|---|---|---|---|---|
| B | | R | | P | |
| C | | A | | | |
| Teacher's value | | | | | |