Teacher Resource Bank

GCE Chemistry 2421

Teachers' Notes (on specimen EMPA)

CHM3X/TN

TEACHERS' NOTES (ON SPECIMEN EMPA): CHM3X/TN

CONFIDENTIAL

An investigation of a varnish remover

Task 1 Observation exercises

Materials

Each candidate should be provided with the following reagents in suitable closed containers.

Reagent	Approximate Concentration	Volume	Note
Barium chloride solution	0.2 mol dm^{-3}	10 cm^3	Labelled "**Varnish remover solution for Task 1**"
Magnesium chloride solution[1]	0.5 mol dm^{-3}	10 cm^3	Labelled "**Solution A**"
Calcium chloride solution	0.5 mol dm^{-3}	10 cm^3	Labelled "**Solution B**"
Barium chloride solution	0.2 mol dm^{-3}	10 cm^3	Labelled "**Solution C**"
Aluminium sulfate solution[2]	0.2 mol dm^{-3}	10 cm^3	Labelled "**Solution D**"
Sulfuric acid	1.0 mol dm^{-3}	10 cm^3	Labelled "**Sulfuric acid**"
Sodium hydroxide	0.5 mol dm^{-3}	20 cm^3	Labelled "**Sodium hydroxide**"
Ammonia solution	0.5 mol dm^{-3}	10 cm^3	Labelled "**Ammonia solution**"
Sodium carbonate solution	0.5 mol dm^{-3}	10 cm^3	Labelled "**Sodium carbonate**"

[1] Centres may use magnesium sulfate solution, of the same concentration, if this is more readily available.
[2] Aluminium sulfate is more readily available than hydrated aluminium chloride, and avoids the problems posed by anhydrous aluminium chloride.

General

Reagents of good analytical quality should be used and spare supplies of all solutions specified in these instructions must be available.

Apparatus

Each candidate will require:

Number	Apparatus
10	test tube
9	dropping pipette
2	test tube rack
	a plentiful supply of purified water (either distilled or de-ionised)
	eye protection

Teacher Result

A teacher must carry out Task 1 of the task, using the same stock solutions. The teacher's observations must be recorded on the Teacher Results Sheet for Task 1. These observations will be used by the examiner to assess the accuracy of the candidate's results. The teacher must not carry out Task 1 of the task in the presence of the candidates.

Task 2 Enthalpy change of neutralisation exercise

Materials

Each candidate should be provided with the following reagents in suitable closed containers.

Reagent	Concentration	Volume	Note
Hydrochloric acid	between 0.9 and 1.10 mol dm^{-3}	60 cm^3	Labelled "**Hydrochloric acid**"
Sodium hydroxide	between 0.9 and 1.10 mol dm^{-3}	50 cm^3	Labelled "**Varnish remover solution for Task 2**"

General

Reagents of good analytical quality should be used and spare supplies of all solutions specified in these instructions must be available.

Apparatus

Each candidate will require:

Number	Apparatus
1	50 cm^3 burette and stand
1	funnel suitable for filling a burette
1	25 cm^3 pipette
1	pipette filler
1	thermometer, measuring 0.2°C or better
1	one stirrer
2	plastic cup (of a size suitable to fit into a 250 cm^3 beaker)
1	250 cm^3 beaker
1	stand, clamp and boss
	a plentiful supply of purified water (either distilled or deionised)
	tissue for drying thermometer
1	a stop clock
	eye protection

Teacher Result

A teacher must carry out Task 2 of the task, using the same stock solutions, in order to obtain a value for the temperature rise. The teacher's value for the temperature rise must be recorded on the Teacher Results Sheet for Task 2. This value will be used by the examiner to assess the accuracy of the candidate's value for Task 2. The teacher must not carry out the task in the presence of the candidates.

Managing the tasks

Centres with more than one teaching set

Centres may wish to divide their candidates into manageable groups and to conduct assessments at different times. This is acceptable provided that candidates in a later session are given a sodium hydroxide solution for Task 2 whose concentration is slightly different from that given to candidates in the earlier sessions.

One week before sitting stage 1 of the EMPA you may inform your candidates:

The aim of this task is to identify the metal hydroxide present in a varnish remover by means of a series of observation exercises and an experiment to determine the enthalpy change of neutralisation of a solution of the varnish remover.

There should be no further discussion of this topic.

SPECIMEN EMPA: CHM3X

Teacher Results Sheet for Task 1 **Centre Number**……

Teacher Name……

Results

Present your results in an appropriate form in the space below.

SPECIMEN EMPA: CHM3X

Teacher Results Sheet for Task 2 **Centre Number**……

Teacher Name……

Results

Present your results in an appropriate form in the space below.