Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Chemistry

Unit 3: Practical Skills

Booklet A

Foundation Tier

GCM31

[GCM31]

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **30**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Follow all health and safety instructions.
You may use a ruler and calculator if required.
The apparatus and materials required to complete the task(s) are provided.
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
Total Marks	

Examiner Only	
Marks	Remark

1 **(a)** Using the 10 cm^3 measuring cylinder, place 10 cm^3 of hydrochloric acid in the test tube and place in the test tube rack.

(i) Describe the appearance of the hydrochloric acid.

_____ [2]

(ii) Using the thermometer, measure the temperature of the hydrochloric acid. Record this temperature including the units.

_____ [1]

(iii) Describe the appearance of the magnesium ribbon.

_____ [2]

(iv) Add the magnesium ribbon to the hydrochloric acid in the test tube.
Stir using the thermometer.
Record the highest temperature obtained, including units.
Record any other observations, apart from the change in temperature.

Highest temperature: _____

Observations: _____

_____

_____ [3]

(b) (i) Describe the appearance of the marble chips.

_____ [2]

(ii) Please read all of the following instructions before starting the practical.

- Using the 25 cm^3 measuring cylinder, place 25 cm^3 of hydrochloric acid in the small beaker.
- Place the beaker on the electronic balance.
- Add the 5 marble chips to the acid in the beaker, start the timer and at the same time record the mass in the table at time 0 minutes.
- Record the mass every minute up to 5 minutes.

Time (minutes)	Mass (g)
0	
1	
2	
3	
4	
5	

[3]

(iii) Calculate the total loss in mass. Include the units.

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** State the maximum volume which can be measured using the burette you have been given. Include the units.

_____ [2]

(b) You will now carry out a titration and use the table below to record the results.
All values in the table should be recorded to 1 decimal place.

	Initial burette reading (cm^3)	Final burette reading (cm^3)	Titre (cm^3)
Rough titration			
First accurate titration			
Second accurate titration			

(i) Carry out the following procedure.

1. Using the 25.0 cm^3 pipette and safety pipette filler place 25.0 cm^3 of sodium hydroxide solution into each of the three conical flasks.
2. Add 3 drops of phenolphthalein indicator to each conical flask.
3. Fill the burette with hydrochloric acid and ensure the jet is filled.
4. Place the first conical flask on a white tile below the burette.
5. Record the initial burette reading for the rough titration in the table.
6. Add hydrochloric acid from the burette to the conical flask until the indicator changes colour.
7. Record the final burette reading for the rough titration and calculate the titre.
8. Refill the burette, if necessary, and place the second conical flask on the white tile below the burette. Record the initial burette reading for the first accurate titration.
9. Add the hydrochloric acid to the conical flask rapidly until approximately 3 cm^3 less acid is added than the titre obtained for the rough titration.
10. Continue to add hydrochloric acid to the conical flask from the burette dropwise until one drop causes the indicator to change colour.
11. Record the final burette reading for the first accurate titration and calculate the titre.
12. Repeat steps 8 to 11 for the second accurate titration.

[9]

(ii) Calculate the average titre. Include the units.

_____ [2]

(iii) State the colour change at the end-point.

From _____ to _____ [2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

240634

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2019

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APPARATUS AND MATERIALS LIST AND CONFIDENTIAL INSTRUCTIONS

It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all practical skills assessments.

Confidential Instructions

1 Requirements for the practical assessment

Three copies of each of the Apparatus and Materials List and Confidential Instructions for the specifications entered by a centre will be delivered to centres at the beginning of November each year for the GCSE Science specifications based on estimated entries made in September for the Year 12 cohort who will be entering for the practical unit in the following summer series. These will be held securely by the Examinations Officer but can be accessed by the Head of Department immediately. The Head of Department can liaise with the relevant technician(s) to order and set up the apparatus and materials as appropriate but ensure the document is held securely when not in use.

All apparatus should be checked before the examination, and there should be an adequate supply of spare apparatus in case of breakages. The Apparatus and Materials List should be regarded as a minimum and there is no objection to candidates being supplied with more than the minimum amount of apparatus and materials. Upon request, a candidate may be given additional quantities of materials without penalty. No notification need be sent to CCEA.

Centres are responsible for providing their own apparatus and materials to conduct the assessments. Practical Skills Booklet A will be delivered to centres in hard copy in the December dispatch and should be held securely by the Examinations Officer until requested by the Head of Department. Booklet A can be completed by candidates from 2nd January until the first Friday in June each year.

For the practical unit (Separate Sciences: Unit 3; Double Award Science: Unit 7; Single Award Science: Unit 4) candidates must be entered at the same tier for all components within the unit. When Booklet A has been completed for a specification, the tier of entry for the practical unit can no longer be changed for each individual candidate.

Please note: The Biology Practical Skills Assessments (Double Award Biology and GCSE Biology only) may have slightly different instructions to be followed when an extra practical set-up session is required. See section 8.

2 Confidentiality

The instructions contained in this document are for the use of the Head of Department **and are strictly confidential**. Under no circumstances may information concerning apparatus or materials be given before the examination to a candidate or other unauthorised person.

It is the responsibility of the centre to ensure that there should be no communication between candidates taking different sessions regarding the practical assessment both within the centre and with other centres. The JCQ regulations on the use of social media (Information for Candidates – Social Media) must be explained to candidates in advance of completing Booklet A.

3 Health and Safety

Appropriate safety advice should be sought from CLEAPSS for the conduct of all practical tasks by the Head of Department when completing their Risk Assessment in advance of the practical sessions.

Clear instructions must be given by the Supervising Teacher to all candidates at the beginning of the examination concerning appropriate safety procedures and precautions. The Supervising Teacher is also advised to remind candidates that all materials in the examination must be treated with caution. **Only those tasks specified in Booklet A should be attempted. Candidates must not attempt any additional confirmatory tasks**. Anything spilled on the skin should be washed off immediately with plenty of water. The use of appropriate eye protection is essential. The Supervising Teacher is reminded that they may not assist candidates during the examination. However if, in the opinion of the Supervising Teacher, a candidate is about to do something which may endanger him/herself or others, the Supervising Teacher must intervene. A full written report must be sent to CCEA immediately by email to the appropriate Subject Officer.

4 JCQ Regulations

All JCQ instructions for conducting examinations should be followed for this practical examination including displaying JCQ posters with examination information in the laboratory and removal of mobile phones. Posters should be available from your Examinations Officer.

Students who really need to leave the examination room during the assessment should be supervised according to the JCQ regulations for external examination conduct.

5 Timetabling, accessing, trialling and storing Booklet A

The School Examinations Officer will receive hard copies of Booklet A based on estimated entries in the December dispatch. The Examinations Officer will hold these securely ***at all times***. They will not be released to any other member of staff. However, the ***Supervising Teacher*** may request **one** copy of Booklet A **three working days** in advance of carrying out the practical assessment with their class in order to trial it to ensure that the materials work as they should, to plan their classroom management of the practical session and to carry out a risk assessment. This copy of Booklet A should be returned to the Examinations Officer for secure storage immediately after trialling and should not be photocopied. Teachers should keep a set of results (and repeats if necessary) from their teacher trial to give to candidates in the event of an emergency. In these circumstances, a report should be sent to the Subject Officer with specification responsibility by email who will decide if a special consideration application is applicable (All Double Award Science reports of special circumstances should be directed to Elaine Lennox and all Single Award Science reports should be directed to Gavin Gray).

On the day of the practical assessment, the Supervising Teacher will request the required number of copies of Booklet A for their class and these must be held securely until the practical session begins. After the practical session is complete, the booklets must be collected from the candidates by the Supervising Teacher, collated in order of Candidate Number (lowest to highest) and returned immediately to the Examinations Officer for secure storage until they are collected by CCEA on the first Friday in June each year to be marked externally.

Completing Booklet A

- Multiple sessions are permitted to accommodate all candidates within the centre. Centres do not have to accommodate all their candidates to carry out the practical assessment on the same day. The Supervising Teacher can decide in which order the candidates should attempt the practical tasks and can manage the session to accommodate the resources available within the centre.
- A suitable laboratory must be reserved for the examination and kept locked throughout the period of preparation and clearance afterwards. Unauthorised persons not involved in the preparation for the examination must not be allowed to enter. Candidates must not be admitted until the specified time for commencement of the examination.
- All used and unused booklets must be returned to the Examinations Officer for secure storage immediately following the session. Unused booklets may be returned to the Head of Department after the first Friday in June each year.
- Foundation and Higher Tier candidates may carry out the practical assessment in the same room, but they may only work with others taking the same tier.

6 Invigilation

For invigilating the practical skills assessment, regulations and conditions set out in the most recent JCQ *Instructions for Conducting Examinations* should be adhered to.

An appropriate science teacher (Supervising Teacher) must be present with an invigilator during the assessment to ensure compliance with health and safety regulations and deal with any technical difficulties that may arise unexpectedly. An invigilator may be any adult in the employment of the school that is not the science teacher of the candidates, for example, this might be another teacher, science technician or teaching assistant. The invigilator should remain with the candidates for the full duration of the assessment and must have read the regulations around invigilating examinations as outlined in JCQ *Instructions for Conducting Examinations*.

The Supervising Teacher should ensure that candidates are supplied with a Booklet A for their correct tier of entry (Foundation Tier papers will be buff coloured and Higher Tier papers will be printed on white paper).

7 Controls for carrying out Booklet A

The practical assessment must be completed under a high level of control (as detailed in the respective specification). Teachers and invigilators must not offer direction or guidance to candidates where this would assist them in completing Booklet A.

The practical session for Booklet A is time limited to a maximum of one hour for each discipline of Double Award Science and a maximum of two hours for GCSE Biology, Chemistry and Physics and Single Award Science. All practical and written tasks with Booklet A must be completed in the same session on the same day.

Not all candidates or classes in a centre need to complete Booklet A at the same time. Candidates who are absent for the practical session may take it at a later date with another class completing the same practical skills assessment or should be accommodated individually by the centre.

Ideally candidates should work individually to carry out the practical tasks where this can be accommodated by centres. However, candidates are permitted to work collaboratively in groups of up to three when carrying out the practical tasks. If candidates are working in groups to complete the practical tasks, it is the Supervising Teacher's responsibility to inform candidates beforehand that each member of the group should participate in practical activity. For Health and Safety purposes, these candidates must be permitted to communicate to each other regarding the practical methodology. All candidates must work individually and independently to complete the written tasks in Booklet A.

Candidates may not have access to their laboratory notes, textbooks, wall displays or the internet at any time during the practical session. They are also not allowed access to dictionaries, spell checks and grammar facilities and should be informed of this beforehand.

Candidates must not attempt a practical assessment Booklet A more than once. Drafting is not permitted under any circumstances and teachers must not give any feedback to candidates.

Candidates should be offered additional sheets of paper upon request that are supplied by CCEA for other external examinations.

8 Biology Practical Skills Assessment (Double Award Biology and GCSE Biology only)

While the majority of Biology practicals will be able to be completed within the given time limit, there may be biological processes/reactions in some practical assessments which take longer than the time allocated to complete.

CCEA will provide candidates with a separate Practical Set-up Instruction Sheet specific to such a practical. This sheet will detail the set-up of the practical and any initial recording that candidates may have to carry out at the point of set-up. An example is available in the GCSE Biology Specimen Assessment Materials (SAMs) which can be found on the Biology microsite. Hard copies will be distributed to centres along with Booklet A based on estimated entries.

The Confidential Candidate Practical Set-up Instruction Sheets should be held in a **confidential and secure place** along with Booklet A by the Examinations Officer. It must not be photocopied. This sheet can be distributed to the Head of Department and Supervising Teachers on the same basis as Booklet A.
Where the Practical Set-up Instruction Sheet is required, one copy of it and one copy of Practical Skills Booklet A can be accessed by the Supervising Teacher from the Examinations Officer **three working days** in advance of the **practical set-up session** which has been planned for candidates, in order to trial the practical. After the practical trialling is complete, both documents must be returned to the Examinations Officer for secure storage.

The Confidential Candidate Practical Set-up Instruction Sheet should be given to the candidates at the beginning of the practical assessment set-up session, which is not time limited. This sheet will detail the set-up of the practical and any initial recording that candidates may have to carry out in advance of completing Booklet A. Any initial recording of data will not contribute to the final marks, nor will the time required for the practical set-up be included in the time allowed for the completion of Practical Skills Booklet A.

Candidates must return the Candidate Practical Set-up Instruction Sheet at the end of the practical set-up session to the Supervising Teacher who must return them to the Examinations Officer immediately for secure storage. The Examinations Officer should then release the Candidate Practical Set-up Instruction Sheets along with Practical Booklet A's to the Supervising Teacher just before the planned session for completing Booklet A. They must be returned to candidates at the beginning of the Practical Skills Assessment to support them in completing Booklet A.

At the end of the Practical Skills Assessment session, candidates must be directed to attach the Confidential Candidate Practical Set-up Instruction Sheet to the back of the completed Practical Skills Booklet A with a treasury tag provided by the Supervising Teacher (these will be supplied to centres by CCEA in the stationery dispatch). The Supervising Teacher should then ensure that the Booklets and attached sheets are arranged in order of Candidate Number (lowest to highest) and returned to the Examinations Officer immediately for secure storage until they are collected by CCEA.

9 Application for Special Consideration (SPC)

Candidates are entitled to the same SPC arrangements in practical examinations as they are in theory examinations including extra time and a reader or scribe. Where the centre finds that a candidate/group of candidates may have been disadvantaged because apparatus or materials did not function as intended, the Supervising Teacher must send a confidential report to the Subject Officer by email detailing the issue and the Candidate Number(s) affected before the June collection date. The Supervising Teacher should liaise with the Examinations Officer regarding applying for SPC in advance of sitting Practical Booklet A.

- CCEA has developed the SPC Online Application to allow centres to submit applications for SPC.
- Please note – paper forms will no longer be accepted unless prior agreement has been approved through CCEA's Centre and Examiner Support Team. Enquiries should be forwarded to specialconsideration@ccea.org.uk
- Teachers are asked to contact their Examinations Officer, who will have access to the secure online application, for further details on how to submit an application for SPC online.
- The SPC application can be accessed from the Central Login portal on the CCEA website or by clicking the link below:
  https://www.qualsadmin.org.uk/CentralisedLoginApplication/

10 Contact Details

Should any queries arise regarding the trialling, conduct and content of Practical Booklet A, please direct your queries to CCEA on the following basis:

GCSE Biology and GCSE DAS Biology

Edith Finlay
Subject Officer for Biology and Agriculture
Email: efinlay@ccea.org.uk
Tel. 028 90 261200 ext. 2267

GCSE Chemistry and GCSE DAS Chemistry

Elaine Lennox
Subject Officer for Chemistry and Double Award Science
Email: elennox@ccea.org.uk
Tel. 028 90 261200 ext. 2320

GCSE Physics, GCSE DAS Physics and SAS

Gavin Gray
Subject Officer for Physics and Single Award Science
Email: ggray@ccea.org.uk
Tel. 028 90 261200 ext. 2270

If your query is about the general administration of Booklet A, please direct your query to:

Nuala Tierney
Specification Support Officer for the STEM Sector
Email: ntierney@ccea.org.uk
Tel. 028 90 261200 ext. 2292

Advice for centres

- All chemicals used should be at least laboratory reagent specification and labelled with appropriate hazard symbols, e.g. flammable.

- For centres running multiple sessions – candidates for the later session should be supplied with clean, dry glassware. If it is not feasible then glassware from the first session should be thoroughly washed, rinsed with deionised water and allowed to drain.

- Candidates should wear safety glasses throughout all practical activities.

- **Ensure all chemicals are in date.**

Please ensure that candidates do not confuse the two different concentrations of hydrochloric acid.

Each group of candidates will require:

- safety glasses
- 1 × test tube
- 1 × test tube rack
- 1 × small beaker (100 cm^3)
- approximately 50 cm^3 of hydrochloric acid (2 mol/dm^3) in a suitable reagent bottle labelled **hydrochloric acid for use in question 1** and with the hazard symbol for **caution** (exclamation mark label)
- 3 cm of magnesium ribbon in a suitable container labelled **magnesium ribbon** and with the hazard symbol for **flammable**
- 5 marble chips in a suitable container labelled **marble chips**
- 1 × thermometer (for example –10/–20 to 100/110 °C) (minimum interval 1°C)
- 1 × 10 cm^3 measuring cylinder
- 1 × 25 cm^3 measuring cylinder
- access to an electronic balance for approximately 5–10 minutes
- 1 × stopclock/stopwatch

- 1 × burette (50 cm^3 burette **but do not inform candidates of capacity during any apparatus checklist beforehand**)
- 1 × 25 cm^3 bulb pipette
- 1 × safety pipette filler
- 1 × white tile
- 3 × 250 cm^3 conical flasks
- waste beaker (100 cm^3 or 250 cm^3)
- retort stand and suitable burette clamp
- approximately 150 cm^3 of sodium hydroxide solution (0.1 mol/dm^3) in a beaker labelled **sodium hydroxide solution** and with the hazard symbol for **caution** (exclamation mark label)
- approximately 150 cm^3 of hydrochloric acid (0.125 mol/dm^3) in a beaker labelled **hydrochloric acid for use in question 2** and with the hazard symbol for **caution** (exclamation mark label)
- 1 × dropper bottle containing phenolphthalein labelled **phenolphthalein** and with the hazard symbol for **flammable**
- 1 × small filter funnel for filling the burette

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SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Butanoate	$C_3H_7COO^-$
Carbonate	CO_3^{2-}
Dichromate	$Cr_2O_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogencarbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	$HCOO^-$
Nitrate	NO_3^-
Propanoate	$C_2H_5COO^-$
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble

Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

COUNCIL FOR THE **CURRICULUM, EXAMINATIONS** AND **ASSESSMENT**
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Email: info@ccea.org.uk Web: www.ccea.org.uk

Rewarding Learning

New Specification

Rewarding Learning

Data Leaflet

Including the Periodic Table of the Elements

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations

gcse examinations

chemistry

For first teaching from September 2017

THE PERIODIC TABLE OF ELEMENTS

Group

1	2											3	4	5	6	7	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La* Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
223 Fr Francium 87	226 Ra Radium 88	227 Ac† Actinium 89	261 Rf Rutherfordium 104	262 Db Dubnium 105	266 Sg Seaborgium 106	264 Bh Bohrium 107	277 Hs Hassium 108	268 Mt Meitnerium 109	271 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112						

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103

* 58 – 71 Lanthanum series
† 90 – 103 Actinium series

a
X
b

a = relative atomic mass (approx)
x = atomic symbol
b = atomic number