



2010 Chemistry

Standard Grade General

Finalised Marking Instructions

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Standard Grade Chemistry General

General information for markers

The general comments given below should be considered during all marking. It should be noted that these are general marking principles and may be superseded by decisions made at the Markers' Meeting.

1. Markers are reminded to read candidate responses **in their entirety**. If the candidate shows a clear understanding of the chemistry but does not use the exact words of the Marking Instructions they should still be given credit.
2. Markers are reminded that **no** comments are to be written on scripts. Comments such as 'ARITH', 'ERROR' and 'BOD' (Benefit of doubt) are **not** acceptable.
3. A guiding principle in marking is to give credit for (partially) correct chemistry rather than to look for reasons not to give marks.

Example: A student measured the pH of four carboxylic acids to find out how the strength is related to the number of chlorine atoms in the molecule. The results are shown.

Structural Formula	pH
CH ₃ COOH	1.65
CH ₂ ClCOOH	1.27
CHCl ₂ COOH	0.90
CCl ₃ COOH	0.51

How is the strength of the acids related to the number of chlorine atoms in the molecule?

Although not completely correct, an answer such as "the more Cl₂, the stronger the acid" should gain the full mark.

4. Marks should **not** be deducted for incorrect spelling or loose language as long as the meaning of the word(s) is conveyed.

Example: Answers like "hydrolic acid" (for "hydrochloric acid") and "it gets hotter" (for "the temperature rises") should be accepted.

However the example below would not be acceptable, as an incorrect chemical term, which the candidate should know, has been given.

Example: If the correct answer is "ethene", and the candidate's answer is "ethane", this should not be accepted.

5. A right answer followed by a wrong answer should be treated as a cancelling error and no marks should be given.

Example: What is the colour of universal indicator in acid solution?

The answer "red, blue" gains no marks.

6. If a right answer is followed by additional information which does not conflict, the additional information should be ignored, whether correct or not.

Example: Why can the tube not be made of copper?

If the correct answer is “It has a low melting point”, and the candidate’s answer is “It has a low melting point and is coloured grey” this would **not** be treated as a cancelling error.

7. Full marks should be awarded for the correct answer to a calculation on its own; the part marks shown in the Marking Instructions are for use when working is given.
8. A half mark should be deducted in a calculation for each arithmetic slip.
9. A half mark should be deducted for incorrect or missing units **only when stated in the Marking Instructions**.
10. A half mark should be deducted for a transcription error.
11. Where a wrong numerical answer (already penalised) is carried forward to another step, no further penalty is incurred provided the end result is used correctly.
12. Ignore the omission of one H atom from a full structural formula provided the bond is shown.
13. A symbol or correct formula should be accepted in place of a name.
14. If an answer comes directly from the text of the question, no marks should be given.

Example: Why do ionic compounds, like copper chloride, conduct electricity when in solution?

No marks for “because they are ionic” since the word “ionic” appears in the text.

15. Unless the question is clearly about a non-chemistry issue, eg costs in industrial chemistry, a non-chemical answer gains no marks.

Example: Why does the (catalytic) converter have a honeycomb structure?

A response such as “to make it work” may be correct but it is not a chemical answer and the mark should not be given.

16. When it is very difficult to make a decision about a partially correct answer, a half mark can be awarded.
17. When marks have been totalled, a half mark should be rounded up.

**2010 Standard Grade Chemistry
General Level**

Marking Instructions

Part 1 – 20 marks

1	(a)	B	1 or 0
	(b)	E	1 or 0
	(c)	F	1 or 0
2	(a)	C	1 or 0
	(b)	E	1 or 0
3	(a)	D and F	1 or 0
	(b)	A and E	1 or 0
4	(a)	B	1 or 0
	(b)	A	1 or 0
5	(a)	D and F	1 or 0
	(b)	C	1 or 0
6	(a)	B	1 or 0
	(b)	E	1 or 0
	(c)	C	1 or 0
7	(a)	A	1 or 0
	(b)	C and E	1 or 0
8		A and E	2 or 1 or 0
9		A and D	2 or 1 or 0

Please note that **NO HALF MARKS** are awarded in Part 1.

Marking Instructions**Chemistry Standard Grade – General****Part 2**

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
10 (a)	Millions Sea bed (both required)	1		
(b)	Sulphur dioxide SO ₂	1	SO ₂ SO ² CO/Carbon monoxide Sulphur oxide Nitrogen dioxide	Right name Wrong formula

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(c)	Bonds (covalent)/single bond/bonding Shared pair of electrons (shared electrons) Attraction between shared e ⁻ and nuclei/both nuclei Carbon to hydrogen bond Carbon hydrogen bond Chemical bonds Definition must be correct – must say: Shared electrons Sharing of electrons (Strong) bond (Molecular) bond	1	Ionic bonds Double bond Intermolecular Shared electron Sharing an electron Atomic bond Electrons on their own Hydrogen bonds Definition must be clear –both nuclei and shared electrons are correct 2 electrons/outer shell electrons	Covalent bond followed by diatomic bond Molecules Covalent bond followed by covalent network Single bonds between electrons

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
11 (a) (i)	Re-lights a glowing splint Glowing splint bursts into flames/catches fire	1	Smouldering Burning/glowing splint test Burns better/brighter Relights a splint	
(ii)	X = carbon dioxide/CO ₂ (½) Y = water//H ₂ O moisture (½)	1	Nutrients on its own/no water Minerals Condensation CO ₂ /CO ² X+Y must not be swapped	Carbon oxide + CO ₂ Both parts must be correct

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(b) (i)	Scale must be labelled Label must say 3 minutes Vertical scale + label ($\frac{1}{2}$) Correct bar labelling ($\frac{1}{2}$) –key/code Bars drawn correctly ($\frac{1}{2}$ box tolerance) Deduct ($\frac{1}{2}$) mark for each incorrect bar up to max 1 Spike graph acceptable If line graph drawn – max 1 mark Horizontal graph ok Deduct ($\frac{1}{2}$) mark if less than half of graph paper has been used on either axis Scale can go up in 4 s – Elodea is 19 – apply $\frac{1}{2}$ box tolerance Accept label without mention of oxygen but the most bubbles in 3 minutes Label – use professional judgement (must have 3 mins)	2	Named gas must be oxygen	
(ii)	Temperature of water/heat from lamp Distance of lamp from plant/distance of lamp/same lamp/bulb Volume of water Brightness/power/wattage Lamp always on Light intensity/amount of light/colour of light Amount/size of plant/mass/surface area No of leaves - notion of keeping plant same/size of leaves No of plants/volume of plants/amount of plants/ background light Same size of beaker/test tube/weight of plant	1	Amount of water Same time Level of water Colour of plant	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
12 (a)	$\text{C}_4\text{H}_{10} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ any order if correct Ignore any balancing	1	= instead of $\rightarrow$ 0 marks	
(b) (i)	Conducts heat/allows heat to pass through	1	Conducts on its own Heats up well Conducts electricity Corrosion resistant etc	
(ii)	Thermosetting Thermoset Thermal setting	1	Thermo	
(c)	Carbon/soot C	1	Charcoal Graphite	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
13 (a)	Potassium or K Carbon or C Oxygen or O/O ₂ (all three required)	1	No extras	Incorrect formula eg K ₂
(b) (i)	Precipitation Precipitate(s)	1		
(ii)	Potassium nitrate or KNO ₃ ignore charges and brackets	1	Copper carbonate	Correct name Wrong formula
(iii)	Filtration/correct description of filtration/filter	1	Sieve Check description, if evaporation of solution to give solid, incorrect	Evaporation

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
14 (a)	Table drawn (½) Suitable headings (½) markers discretion Metal Elements Steel Correct entries (1) Pairs must be correct Deduct (½) mark for each missing/incorrect pair of entries up to a maximum of 1 mark 3 or 4 columns ok – extra information	2	Mg instead of manganese	
(b) (i)	Water (H₂O) Moisture Rain (½) Oxygen (O or O₂) Air (½)	1		
(ii)	Sacrificial	1	Electrical Chemical Electro-chemical	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(c)	Paint/attach negative terminal of battery/greasing/oiling galvanising/coat it in plastic/tin plate/zinc coat/ electroplating/cathodic/metal coating/platinum coating	1	Coating on its own Barrier Physical on its own Pumping electricity through it Sacrificial Physical Adding oil	Galvanising with, eg, Mg

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
15 (a)	Diatomic/Diatomic element	1	Diatomic compound	
(b)	Electrolysis/Electrolysing (look at spelling) Electrolysation	1	Electro <u>lyte</u>	
(c) (i)	Less CO ₂ produced/lower carbon emissions Water is produced/no carbon dioxide produced No/less harmful/greenhouse/poisonous gases Less harmful to environment Renewable Not using 'finite' resources No/less pollution Uses less energy does not negate/ignore additional information eg more powerful uses less energy	1	Cheaper Can be recharged More powerful on its own	
(ii)	Air/atmosphere/ Water	1	Plants B.O.C Sky	
(iii)	Speed up reaction Lower temperature/less energy	1	(cost/saves money on its own is not acceptable) It is unchanged Pt is unchanged Changes harmful to less harmful	Speeds up and slows down reaction Turns harmful to less and speeds up

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
16 (a)	Potassium (K) or Phosphorus (P)	1		
(b)	Insoluble Does not dissolve	1	Can't be broken down Toxic Too soluble	
(c)	Roots/nodules	1	Nodes	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
17 (a)	Alkanes	1	-ane	C_nH_{2n}
(b) (i)	Octane or boiling tube or test tube Aluminium oxide/catalyst (Bromine) solution/water/Br_2 Catalyst and octane Accept: Alumninium oxide/octane together } all 3 labelled correctly	1		
(ii)	C_5H_{12} Pentane Correct structural diagram	1	If name and formula given both must be correct	
(iii)	Poly(propene) Polypropene Polypropylene	1	Polyprop <u>a</u> ne	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
18 (a)	Solvent	1		
(b) (i)	As the temperature of the water $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$ the solubility $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$. OR The solubility $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$ as the temperature $\left\{ \begin{array}{l} \text{increases} \\ \text{decreases} \end{array} \right\}$. As the temperature of water increases the solubility does as well	1	As more solubility increases the temperature increases The higher the temperature the faster the reaction Must be clear Markers discretion	
(ii)	53 (+/-1)	1		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
19 (a)	From iron to copper/right to left on diagram Arrow near the wire in correct direction	1	Direction indicated on ion bridge Arrow in solution Wrong direction Iron to copper/right to left	
(b)	Ions able/free to move (in solution) Free ion Ionic lattice broken down/or up (<u>ionic</u> must be written)	1	Charged particles Electrons free to move Crystal lattice Electrolytes Charged particles free to move Lattice broken down – no mention of ions They have room to move Ions let electricity pass through Particles are free to move Ions carry electrons through solution	
(c)	Nickel (Ni) Tin (Sn) Lead (Pb) Silver (Ag) Mercury (Hg)	1	Gold (au) Copper (cu)	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(d)	To complete/finish the circuit/cell Allow ions to move/flow/transfer ions	1	To provide ions Allows electricity to pass through/ flow Conducts electricity (Allows electrons to flow – on its own) Allow electricity to flow To connect the electrolytes To keep/allow circuit flowing	To transfer ions from copper to iron (must specify solution)

[END OF MARKING INSTRUCTIONS]