UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0620 CHEMISTRY

0620/21 Paper 2 (Core Theory), maximum raw mark 80

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1 **(a)** (period) 2 / period II [1]

(b) **(i)** O / O_2 / oxygen [1]

(ii) F / F_2 / fluorine [1]

(iii) Li / lithium [1]

(iv) C / carbon [1]

(v) Be / beryllium [1]

(vi) N / N_2 / nitrogen [1]

(c) atoms; protons [2]

[Total: 9]

2 **(a)** thermal decomposition [1]

(b) **(i)** carbon dioxide [1]

(ii) (colourless) to white / milky
IGNORE: goes cloudy [1]

(c) **(i)** calcium oxide blown onto surface of iron / mixed with iron / blown into furnace with iron / mixed in furnace with iron; [1]
forms slag / removes impurities (or named impurities) in iron / reacts with silicon dioxide / reacts with phosphorus oxides / reacts with acidic oxides [1]

(ii) mixture of metal with other metals or mixture of metal(s) with non-metals [1]

(iii) neutralising acid soils / neutralising acidic lakes / <u>making</u> cement / <u>making</u> limewater / limewash for buildings
ALLOW: paint [1]

(iv) 2; H_2O [2]

(v) calcium chloride [1]

[Total: 10]

3 **(a)** balloons / diving / cryogenics / coolant / arc welding / protective atmosphere / lasers [1]
NOT: hot air balloons

(b) **(i)** nucleus [1]

(ii) 3rd box down ticked (helium has complete outer shell) [1]

(iii) 18 [1]

(iv) $^{34}_{18}Ar$ [1]

(c) atoms close together;
NOT: atoms on average more than ½ an atom's diameter from each other
atoms randomly arranged [2]

[Total: 7]

4 **(a)** chloride; [1]
NOT: chlorine
sulfate [1]

(b) 2.32
IGNORE: wrong units [1]

(c) **(i)** add sodium hydroxide and aluminium (foil);
warm gently;
IGNORE: any results given
ALLOW: add iron(II) sulfate
then concentrated sulfuric acid [2]

(ii) ammonia [1]

(d) **(i)** flask IGNORE incorrect type;
condenser ALLOW: condensing tube;
pure water / distilled water; [3]

(ii) any two of:
- distillation
- water (in round bottomed flask) boiled
  NOT: water heated / water evaporates
- water has a lower boiling point (than ions)
- steam (or water vapour) condenses in condenser / steam or water vapour goes to liquid in condenser
  ALLOW: gas goes to liquid in condenser
- solid / ions remain in flask [2]

(iii) medicines / drugs / foodstuffs / (drinking) water [1]

[Total: 12]

5 **(a)** pH 11 [1]

(b) 4th box down ticked (slaked lime) [1]

(c) **(i)** plants can't grow well if soil too acidic / crop yields lower if too acidic [1]
ALLOW: plants die if soil acidic
ALLOW: plants grow best in neutral soil / plants like neutral soil

(ii) any three of:
fossil fuels (or correctly named fuel) contain sulfur /
sulfur burns /
to form sulfur dioxide /
sulfur dioxide reacts with oxygen in air /
sulfur dioxide (or sulfur trioxide) reacts (or dissolves) with rain [3]

(d) **(i)** neutralisation ALLOW: neutralising [1]

(ii) add indicator to flask ALLOW: any named acid-base indicator; [1]
any two of:
- add measured amount of calcium hydroxide to flask (or use a volumetric pipette to put the calcium hydroxide in the flask)
- add acid (from burette) into flask
- until indicator changes colour
- record volume of acid added [2]

[Total: 10]

6 **(a)** **(i)** bauxite / any other ore of aluminium [1]

(ii) removal of oxygen (from compound or substance) / gain of electrons / decrease in oxidation number / addition of hydrogen [1]

(iii) too reactive / requires too high a temperature [1]

(b) from left to right:
lead, nickel, zinc, magnesium [2]

(c) **(i)** (volume) decreases [1]

(ii) (volume) increases [1]

(d) copper → electrical wiring;
aluminium →aircraft bodies ALLOW car bodies or electrical wiring;
mild steel → car bodies;
stainless steel → chemical plant [4]

[Total: 11]

7 **(a)** **(i)** (group of) molecules with similar boiling points / (group of) molecules with similar relative molecular masses / molecules with limited range of boiling points / molecules with limited range of molecular masses / molecules coming off at the same place in the fractionation column
IGNORE: division of petroleum components [1]

(ii) $C_{10}H_{22}$
ALLOW reasonable mixtures e.g. $C_7H_{16} + C_3H_6$ [1]

(b) refinery gas: (fuel) for heating / (fuel) for cars / (fuel) for cooking;
gasoline: (fuel) for cars / mowers etc [2]

(c) contains double bonds / contains C=C bonds;
compound containing carbon and hydrogen only [2]

(d) **(i)** 1st box down ticked (catalytic addition of steam) [1]

(ii) correct structure with all atoms and bonds shown
OH instead of O-H = 1 mark only [2]

(e) monomers;
polymers; [2]

[Total: 11]

8 **(a)** electrodes [1]

(b) lead / Pb; [1]
bromine / Br_2 / Br [1]
NOT: lead ions, bromide ions

(c) 2nd and 3rd boxes down ticked (1 each) [2]

(d) $PbBr_2$ [1]

(e) **(i)** solid formed when two solutions mixed [1]
NOT: solid formed at bottom of solution

(ii) 3

(iii) 6 [2]

(iv) brain damage in children / affects nervous systems or nerves / poisonous [1]

[Total: 10]