UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice **October/November 2009**

45 Minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
You may use a calculator.

1 A student separates salt from a mixture of salt and sand.

What is the correct order of steps for the student to take?

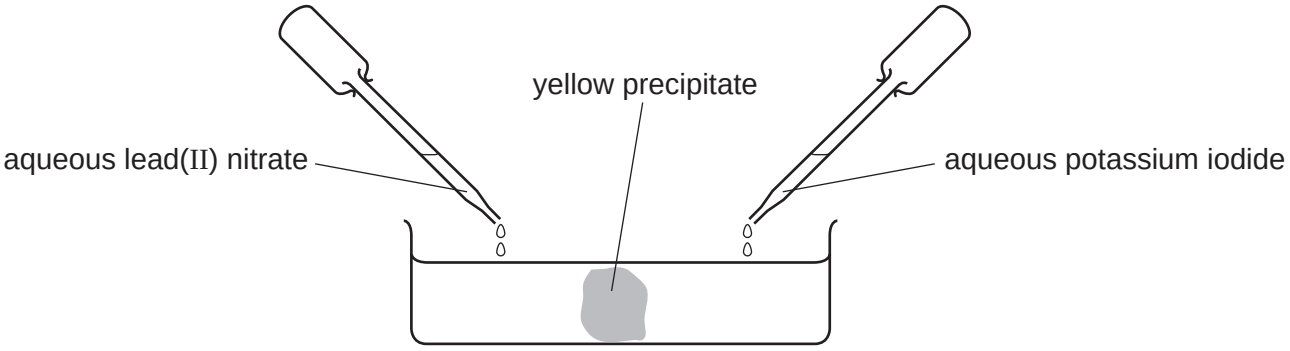
A filter → evaporate → shake with water

B filter → shake with water → evaporate

C shake with water → evaporate → filter

D shake with water → filter → evaporate

2 Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.



A yellow precipitate forms after a few minutes.

Which process occurs before the precipitate forms?

A diffusion

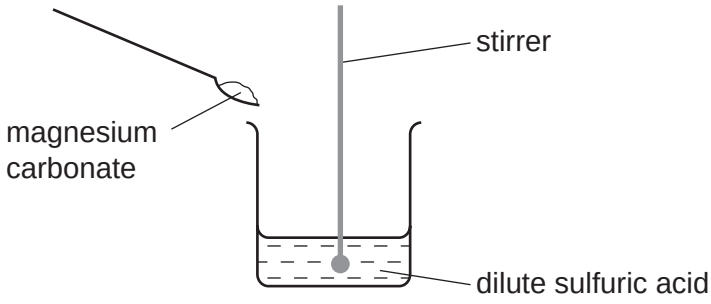
B distillation

C fermentation

D filtration

3 A student carries out an experiment to prepare pure magnesium sulfate crystals.

The diagram shows the first stage of the preparation.



He adds magnesium carbonate until no more reacts.

Which process should he use for the next stage?

A crystallisation

B evaporation

C filtration

D neutralisation

4 Which change to an atom occurs when it forms a positive ion?

A It gains electrons.

B It gains protons.

C It loses electrons.

D It loses protons.

5 Statements 1, 2 and 3 are about diamond and graphite.

1 They are different solid forms of the same element.

2 They each conduct electricity.

3 They have atoms that form four equally strong bonds.

Which statements are correct?

A 1 only **B** 3 only **C** 1 and 3 **D** 2 and 3

6 Covalent bonds are formed when electrons are ……1…… . Covalent compounds have ……2…… electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
A	shared	high
B	shared	low
C	transferred	high
D	transferred	low

7 Atom X has 8 more electrons than atom Y.

Student 1 says they are in the same group.

Student 2 says they are unreactive.

Which students can be correct?

	student 1	student 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

8 Which number is different for isotopes of the same element?

A number of electrons

B number of full shells

C number of nucleons

D number of protons

9 Which atom has two more electrons than an atom of a noble gas?

A aluminium

B bromine

C calcium

D rubidium

10 For each atom of carbon present in a molecule, there is an equal number of atoms of oxygen but twice as many atoms of hydrogen.

What is the formula of the molecule?

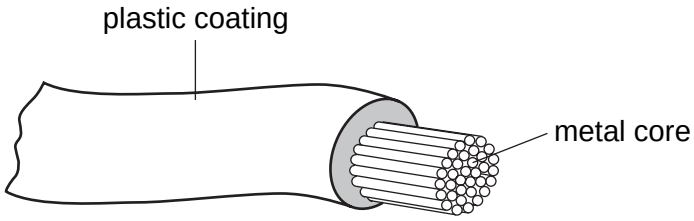
A $C_2H_2O_2$ **B** $C_2H_2O_4$ **C** $C_2H_4O_2$ **D** C_2H_6O

11 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.

What mass of oxygen combines with 2 g of hydrogen?

A 12 g **B** 16 g **C** 96 g **D** 144 g

12 The diagram shows an electrical cable.



Which statement about the substances used is correct?

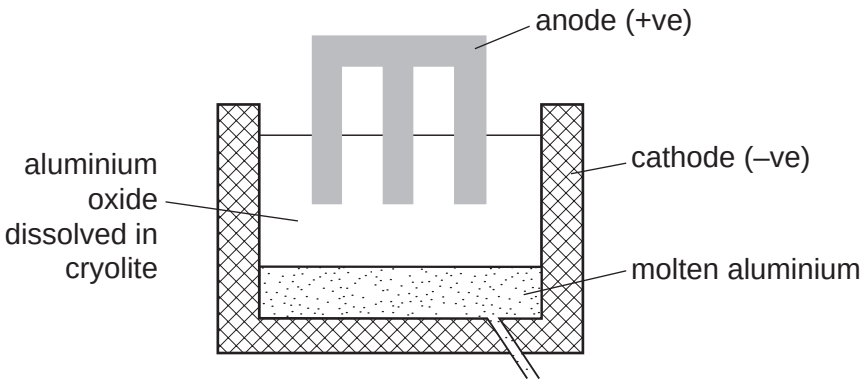
A The coating is plastic because it conducts electricity well.

B The core is copper because it conducts electricity well.

C The core is copper because it is cheap and strong.

D The core is iron because it is cheap and strong.

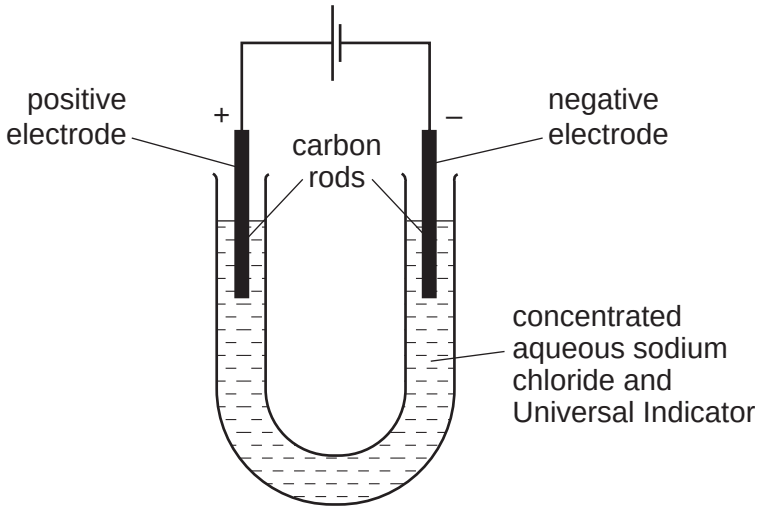
13 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode	cathode
A	aluminium	aluminium
B	aluminium	graphite
C	graphite	aluminium
D	graphite	graphite

14 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the Universal Indicator at each electrode after five minutes?

	colour at anode (+ electrode)	colour at cathode (– electrode)
A	blue/purple	red
B	red	blue/purple
C	red	colourless
D	colourless	blue/purple

15 When an acid is added to an alkali the temperature rises.

Which words describe this reaction?

A decomposition and endothermic

B decomposition and exothermic

C neutralisation and endothermic

D neutralisation and exothermic

16 Substance X requires oxygen in order to produce energy.

It does **not** form carbon dioxide as a result of this energy production.

What is substance X?

A hydrogen

B natural gas

C petrol

D ^{235}U

17 Which change does **not** increase the speed of reaction between zinc and hydrochloric acid?

A adding a catalyst

B decreasing the temperature

C decreasing the particle size of the zinc

D using more concentrated acid

18 When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reaction
A	a mixture	can be reversed
B	a mixture	cannot be reversed
C	hydrated	can be reversed
D	hydrated	cannot be reversed

19 The equations represent redox reactions.

In which equation is the underlined substance acting as a reducing agent?

A $\underline{CaO} + H_2O \rightarrow Ca(OH)_2$

B $\underline{CO_2} + C \rightarrow 2CO$

C $\underline{CuO} + H_2 \rightarrow Cu + H_2O$

D $3\underline{CO} + Fe_2O_3 \rightarrow 2Fe + 3CO_2$

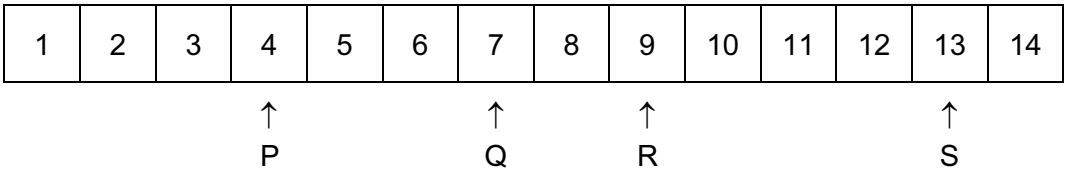
20 An aqueous solution Y contains both barium ions and silver ions.

In separate experiments, dilute sulfuric acid and dilute hydrochloric acid are added to solution Y.

Which of these acids causes a precipitate to form in solution Y?

	dilute sulfuric acid	dilute hydrochloric acid
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

21 The diagram shows the pH values of four solutions.



Which of these solutions are alkaline?

A P only

B P and Q only

C Q, R and S only

D R and S only

22 Salts can be prepared by reacting a dilute acid

1 with a metal;

2 with a base;

3 with a carbonate.

Which methods could be used to prepare copper(II) chloride?

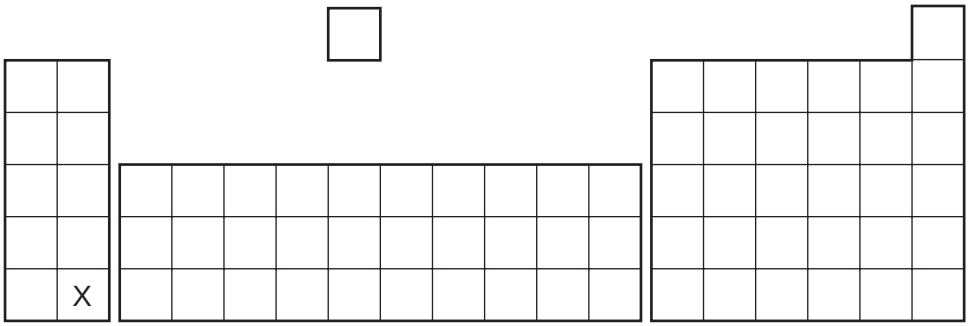
A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

23 The diagram shows the position of an element X in the Periodic Table.



What is the correct classification of element X and its oxide?

	X	oxide of X
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

24 Elements in Group 0 of the Periodic Table have uses.

These noble gases are ……1…... and this explains why argon ……2…… be used in lamps.

Which words correctly complete gaps 1 and 2?

	1	2
A	reactive	can
B	reactive	cannot
C	unreactive	can
D	unreactive	cannot

25 Astatine is an element in Group VII of the Periodic Table. It has only ever been produced in very small amounts.

What is the best description of its likely properties?

	colour	state	reaction with aqueous potassium iodide
A	black	solid	no reaction
B	dark brown	gas	brown colour
C	green	solid	no reaction
D	yellow	liquid	brown colour

26 Which property do **all** metals have?

A They are soluble in water.

B They conduct electricity.

C They have high melting points.

D They react with dilute sulfuric acid.

27 The table gives information about four elements.

Which element is a transition metal?

	colour of element	electrical conductivity of element	colour of oxide
A	black	high	colourless
B	colourless	low	white
C	grey	high	red
D	yellow	low	colourless

28 Some reactions of three metals are listed in the table.

metal	reacts with dilute hydrochloric acid	metal oxide is reduced by carbon
P	yes	yes
Q	no	yes
R	yes	no

What is the order of reactivity of the metals?

	most reactive →		least reactive
A	P	R	Q
B	R	P	Q
C	R	Q	P
D	Q	P	R

29 Which object is **least** likely to contain aluminium?

A a bicycle frame

B a hammer

C a saucepan

D an aeroplane body

30 Which statement about alloys is **not** correct?

A Alloys are more expensive than the metals they are made from.

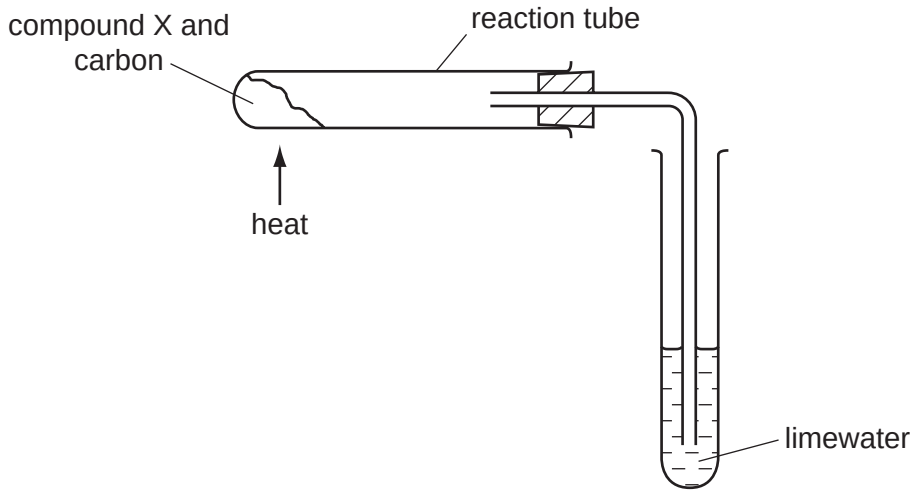
B Alloys are mixtures of different metals.

C Alloys are not as strong as the metals they are made from.

D Alloys conduct electricity well.

[Turn over

31 Compound X is heated with carbon using the apparatus shown.



A brown solid is formed in the reaction tube and the limewater turns cloudy.

What is compound X?

A calcium oxide

B copper(II) oxide

C magnesium oxide

D sodium oxide

32 Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and bacteria?

	to remove solid impurities	to remove bacteria
A	chlorination	chlorination
B	chlorination	filtration
C	filtration	chlorination
D	filtration	filtration

33 A newspaper article claims that carbon dioxide is formed as follows.

1 during respiration

2 when calcium carbonate reacts with hydrochloric acid

3 when methane burns in air

Which statements are correct?

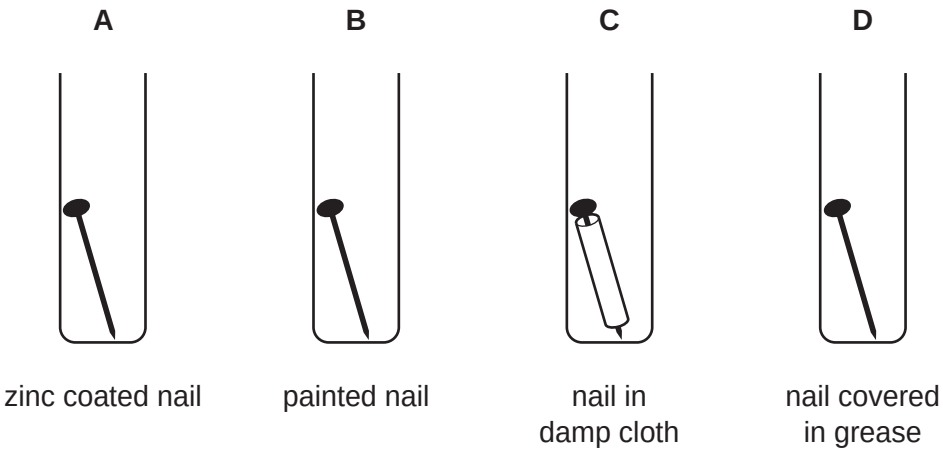
A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

34 Which iron nail rusts?



35 Fertilisers are used to provide three of the elements needed for plant growth.

Which two compounds would give a fertiliser containing all three of these elements?

A $Ca(NO_3)_2$ and $(NH_4)_2SO_4$

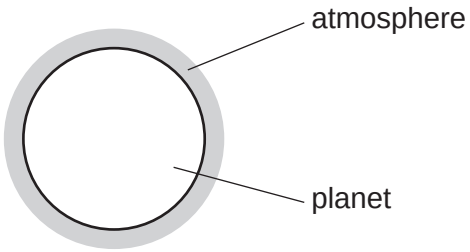
B $Ca(NO_3)_2$ and $(NH_4)_3PO_4$

C KNO_3 and $(NH_4)_2SO_4$

D KNO_3 and $(NH_4)_3PO_4$

[Turn over

36 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of the atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

A carbon dioxide and oxygen

B carbon dioxide only

C nitrogen and oxygen

D nitrogen only

37 Butene and hexene belong to the same homologous series.

What is the same for butene and hexene?

A boiling point

B functional group

C number of hydrogen atoms per molecule

D relative molecular mass

38 Which statement about petroleum is **not** correct?

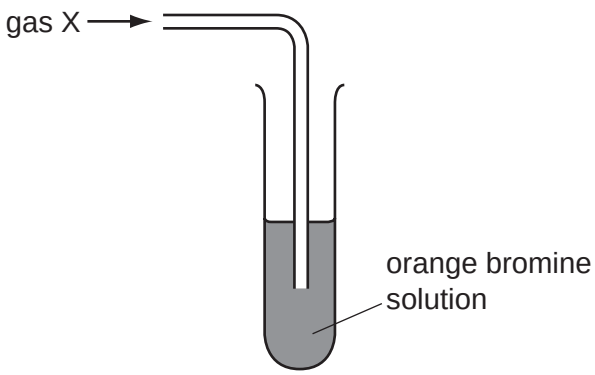
A It can be separated into useful substances by fractional distillation.

B It consists mainly of hydrocarbons.

C It is found underground in many parts of the world.

D Its main use is for making lubricants and polishes.

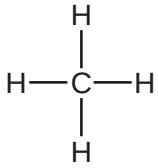
39 The apparatus shows an experiment used to test gas X.



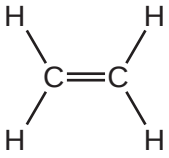
The bromine solution quickly becomes colourless.

What is the structure of gas X?

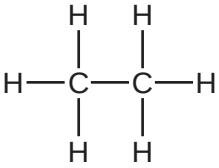
A



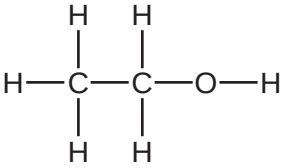
B



C



D



40 The table shows the formulae of members of the alkane series.

name of compound	formula
methane	CH_4
ethane	C_2H_6
propane	?
butane	C_4H_{10}
pentane	C_5H_{12}

What is the formula of propane?

A C_2H_8 **B** C_3H_7 **C** C_3H_8 **D** C_3H_9

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0
															4 He Helium 2
					1 H Hydrogen 1										
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	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	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).