

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level
COMBINED SCIENCE
PAPER 1 Multiple Choice

5129/1

MAY/JUNE SESSION 2002

1 hour

Additional materials:

- Multiple Choice answer sheet
- Soft clean eraser
- Soft pencil (type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

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

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

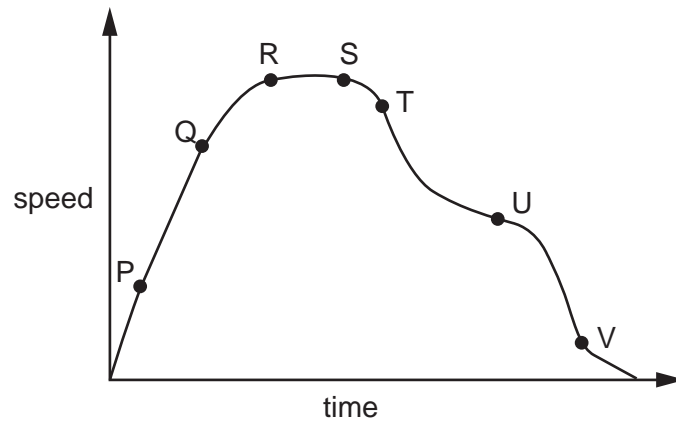
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

This question paper consists of 15 printed pages and 1 blank page.



- 1 The graph shows how the speed of a body varies with time.

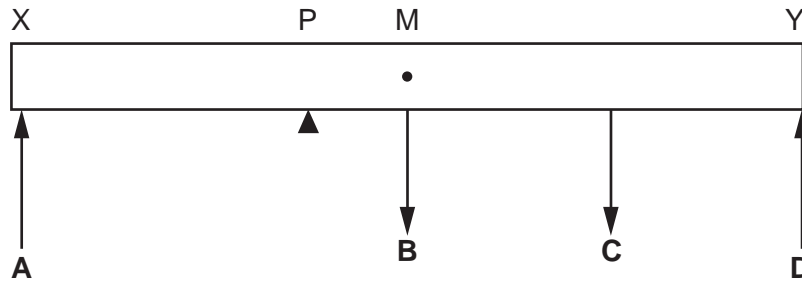


Between which points is the body moving with constant acceleration?

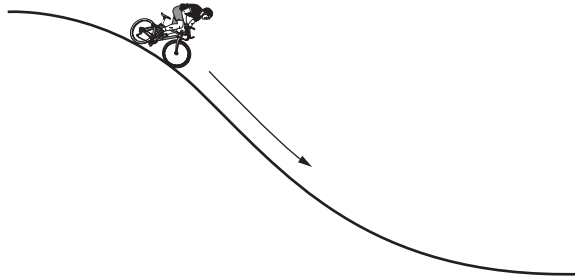
- A P and Q
 - B R and S
 - C T and U
 - D U and V
- 2 An object of mass of 2.0 kg is situated at a point where there is a gravitational field of strength 9.0 N/kg.
- What is the weight of the object?
- A 0.2 N
 - B 4.5 N
 - C 18.0 N
 - D 20.0 N
- 3 Which measurements are needed to determine the density of a solid?
- A mass and force
 - B mass and volume
 - C pressure and force
 - D pressure and volume

- 4 A uniform beam XY, with centre of mass at M, rests on a pivot at P as shown.

Which force would balance the beam on the pivot?



- 5 A cyclist accelerates down a slope.



How does the cyclist's energy change?

	<i>potential energy</i>	<i>kinetic energy</i>
--	-------------------------	-----------------------

- | | | |
|----------|-----------|-----------|
| A | decreases | decreases |
| B | decreases | increases |
| C | increases | decreases |
| D | increases | increases |

- 6 An infra-red lamp is placed in front of four differently coloured metal plates. The plates are all the same size and the lamp is an equal distance from each of them.

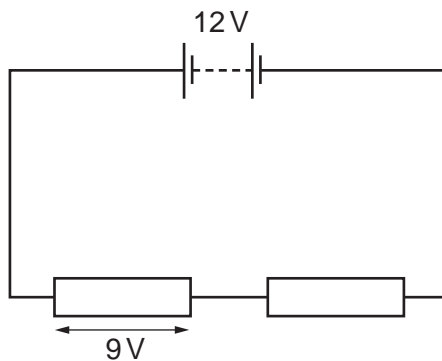
Which plate will absorb the most infra-red radiation?

- A** black
- B** blue
- C** white
- D** yellow

- 7 A water wave has a wavelength of 20 cm and a speed of 100 cm/s

What is the frequency of the wave?

- A** 0.2 Hz **B** 5.0 Hz **C** 120 Hz **D** 2000 Hz
- 8 Which of the following shows that a piece of metal is already a magnet?
- A** A magnet is attracted to it.
B Both ends of a compass needle are attracted to it.
C Copper wire is attracted to it.
D One end of a compass needle is repelled by it.
- 9 Which of the following quantities has the same unit as electromotive force?
- A** charge
B current
C potential difference
D power
- 10 A battery is connected to two resistors in series. The p.d. across the battery is 12 V and the p.d. across one resistor is 9 V.



What is the p.d. across the other resistor?

- A** 3 V **B** 9 V **C** 12 V **D** 21 V

- 11 A plug connected to a table lamp contains a 3 A fuse.

Why is the fuse needed?

- A to increase the resistance of the circuit
 - B to make it easier for the current to flow
 - C to protect the wiring from overheating
 - D to reduce the voltage across the lamp
- 12 What is the purpose of a step-down transformer?
- A It makes the output current lower than the input current.
 - B It makes the output current the same as the input current.
 - C It makes the output voltage higher than the input voltage.
 - D It makes the output voltage lower than the input voltage.
- 13 Boxes which are used to store radioactive substances are usually lined with lead.

Why is this?

- A It is a good thermal conductor.
 - B It prevents background radiation from entering the box and contaminating the contents.
 - C It prevents much of the radiation from escaping into the surroundings.
 - D It stops the box from being knocked over easily.
- 14 A nuclide is represented by ${}_{17}^{35}\text{Cl}$.

How many neutrons and protons does each nucleus contain?

	neutrons	protons
A	18	35
B	18	17
C	17	35
D	17	18

- 15 Which diagram shows the arrangement of particles inside a balloon filled with a mixture of helium and argon?

A B C D

key
 • helium atom
 ○ argon atom

- 16 Which method is most suitable for obtaining a pure, dry sample of sodium chloride from a mixture of solid sodium chloride and sand?

- A Heat the mixture gently and collect the substance which boils off.
 B Heat the mixture gently and collect the substance which melts.
 C Shake the mixture with water and distil off the liquid.
 D Shake the mixture with water, filter and evaporate the filtrate.

- 17 An atom of argon has 18 electrons.

Which of the following ions does **not** have 18 electrons?

- A Ca^{2+} B Cl^- C K^+ D O^{2-}

- 18 An aqueous solution of **X** conducts electricity.

Substance **X** has a high melting point.

What could **X** be?

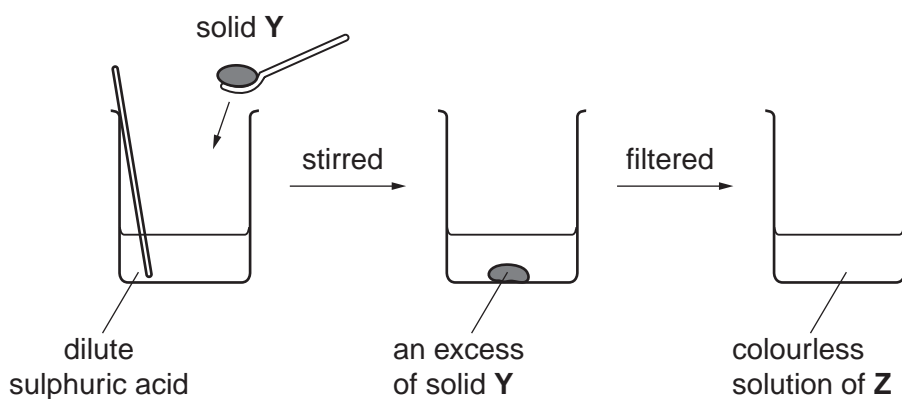
- A calcium chloride
 B carbon dioxide
 C diamond
 D hydrogen chloride

19 The colour of Universal Indicator in each of four solutions is shown in the table.

Which solution is likely to be an acid of pH 2–3?

solution	colour of Universal Indicator paper
A	blue
B	green
C	red
D	violet

20 The diagrams show how a colourless solution of **Z** is produced from the reaction between dilute sulphuric acid and a solid **Y**.



What are **Y** and **Z**?

	Y	Z
A	copper(II) oxide	copper(II) sulphate
B	silver	silver sulphate
C	barium nitrate	barium sulphate
D	magnesium carbonate	magnesium sulphate

21 Rubidium is in Group I of the Periodic Table.

What is the formula of rubidium carbonate?

- A** RbCO_3 **B** $\text{Rb}(\text{CO}_3)_2$ **C** Rb_2CO_3 **D** $\text{Rb}_2(\text{CO}_3)_3$

- 22 Which metal has the **least** tendency to form positive ions?
- A calcium
 - B iron
 - C magnesium
 - D sodium
- 23 Which of the following metals does **not** react with dilute hydrochloric acid to give hydrogen?
- A calcium
 - B copper
 - C iron
 - D magnesium
- 24 Which substance, present in car exhaust fumes, does **not** pollute the atmosphere?
- A carbon monoxide
 - B nitrogen
 - C nitrogen oxides
 - D unburned hydrocarbons
- 25 The table shows the boiling point ranges of fractions collected from the distillation of a sample of crude oil.

Which fraction contained the smallest molecules?

fraction	boiling point range
A	20 – 50 °C
B	50 – 100 °C
C	100 – 150 °C
D	150 – 250 °C

- 26 Which equation represents the combustion of methane in an excess of oxygen?
- A $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2$
 - B $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 - C $2\text{CH}_4 + \text{O}_2 \rightarrow 2\text{CO} + 4\text{H}_2$
 - D $2\text{CH}_4 + 3\text{O}_2 \rightarrow 2\text{CO} + 4\text{H}_2\text{O}$

27 When C_2H_5OH is oxidised it forms substance **Z**.

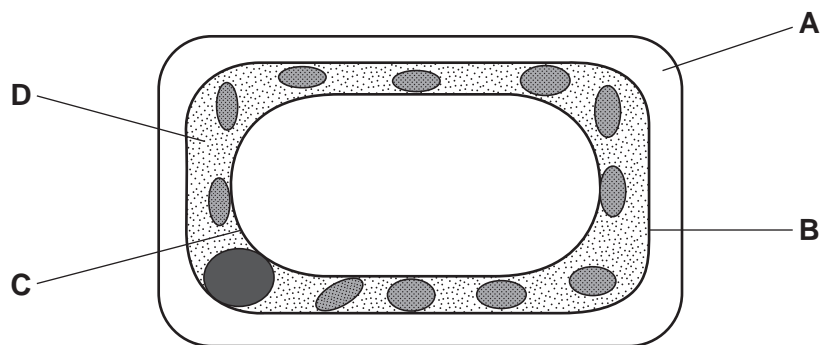
This substance reacts with C_2H_5OH to produce an ester.

What is substance **Z**?

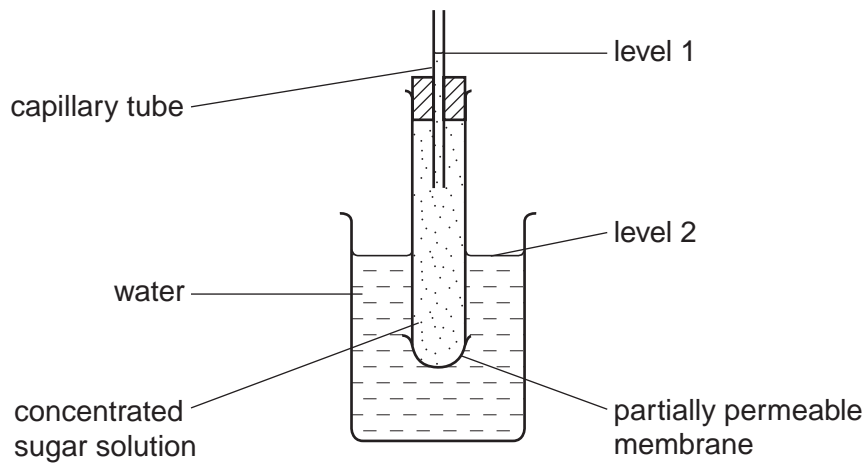
- A HCO_2H
- B CH_3CO_2H
- C $CH_3CH_2CO_2H$
- D $CH_3CH_2CH_2CO_2H$

28 The diagram shows a plant cell.

Which structure controls the passage of substances into and out of the cell?



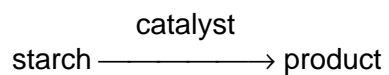
29 The diagram shows apparatus used to investigate osmosis.



Which molecules will move across the membrane and which changes in levels will occur?

	molecules	level 1	level 2
A	sugar	fall	rise
B	water	fall	rise
C	sugar	rise	fall
D	water	rise	fall

30 The following reaction occurs in the human alimentary canal.



What are the catalyst and the product?

	catalyst	product
A	acid	glucose
B	alkali	energy
C	amylase	maltose
D	bile	amino acid

31 Four types of cell found in the leaf of a green plant are listed below.

- 1 epidermal cells (not including guard cells)
- 2 guard cells
- 3 palisade mesophyll cells
- 4 spongy mesophyll cells

Which types of cell contain chloroplasts?

- A** 1 and 2 only
B 1, 3 and 4 only
C 2 and 3 only
D 2, 3 and 4 only

32 In which order do these events occur in human nutrition?

- A** digestion → ingestion → absorption → assimilation
B digestion → ingestion → assimilation → absorption
C ingestion → digestion → absorption → assimilation
D ingestion → digestion → assimilation → absorption

33 Blood samples from three veins in the body were tested for concentration of oxygen, carbon dioxide and urea. The results, in arbitrary units, are shown in the table.

vein	oxygen concentration	carbon dioxide concentration	urea concentration
1	40	48	1.5
2	40	48	7.5
3	90	40	4.0

From which organs were the veins carrying blood?

	kidney	liver	lung
A	1	2	3
B	2	3	1
C	3	1	2
D	3	2	1

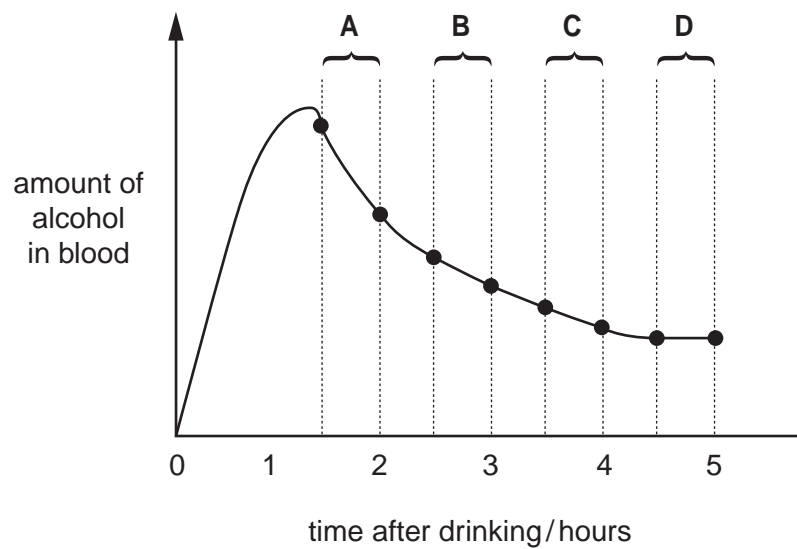
34 Which statement about anaerobic respiration in muscles is correct?

- A An oxygen debt develops.
- B It releases more energy than aerobic respiration.
- C It takes place in the alveoli.
- D It takes place mainly during sleep.

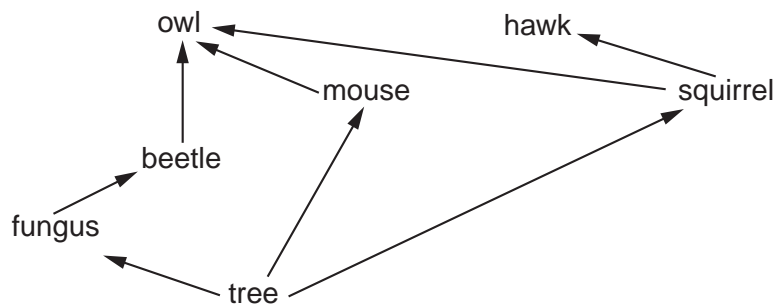
35 Samples of blood are taken every half hour from a person who has been drinking alcohol.

The graph shows the amount of alcohol in this person's blood.

During which period is alcohol removed fastest from the blood?



36 The diagram shows a food web.

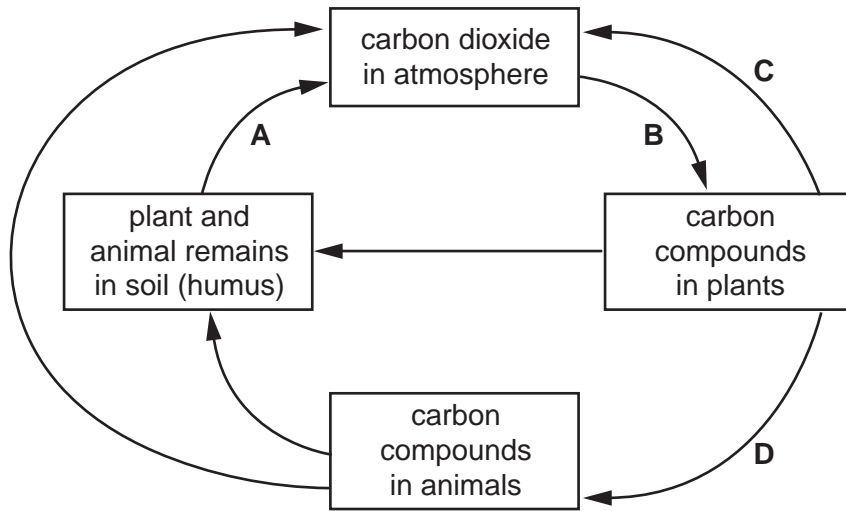


Which of the organisms, shown in the food web, can survive by taking in only simple inorganic materials?

- A beetle
- B fungus
- C hawk
- D tree

37 The diagram shows part of the carbon cycle.

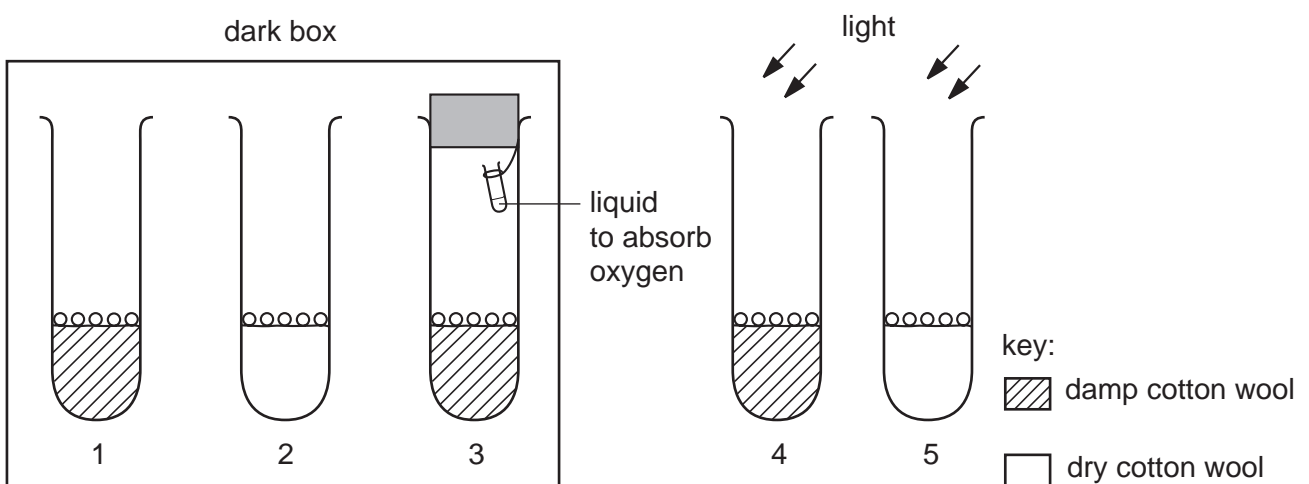
Which arrow represents the process of photosynthesis?



38 Which of the following does **not** contribute to famine?

- A decreased population
- B drought
- C flooding
- D unequal distribution of food

39 In the experiment shown, each test-tube contains mustard seeds on cotton wool.



Which two test-tubes should be compared to discover whether light is needed for germination of these seeds.

- A 1 and 4
- B 2 and 4
- C 3 and 5
- D 4 and 5

40 What is the path taken by sperm cells during ejaculation from the male reproductive system?

- A sperm duct → testis → urethra
- B sperm duct → urethra → testis
- C testis → sperm duct → urethra
- D testis → urethra → sperm duct

DATA SHEET
The Periodic Table of the Elements

		Group														
I	II	III	IV	V	VI	VII	O									
		1 H Hydrogen 1										4 He Helium 2				
7 Li Lithium 3	9 Be Beryllium 4											20 Ne Neon 10				
23 Na Sodium 11	24 Mg Magnesium 12											35.5 Cl Chlorine 17				
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	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	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	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	210 Rn Radon 86
87 Fr Francium	88 Ra Radium	89 Ac Actinium														

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	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	238 Pa Protactinium 91	238 U Uranium 92	238 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 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 dm³ at room temperature and pressure (r.t.p.).