CAMBRIDGE
International Education

Cambridge IGCSE™ (9–1)

CHEMISTRY **0971/22**

Paper 2 Multiple Choice (Extended) **May/June 2026**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

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INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.

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1 The arrangements of particles in solids, liquids and gases are different.

Which statement about the molecules in ice, water or steam is correct?

A The H_2O molecules are on average closest together in steam.

B The H_2O molecules are on average furthest apart in water.

C The H_2O molecules in steam have the second highest average velocity.

D The H_2O molecules in ice are able to vibrate.

2 A sealed glass container contains 200 cm^3 of oxygen at 100 °C.

The container is cooled to 25 °C.

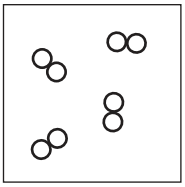
Which row shows how the average kinetic energy of the oxygen molecules and the pressure inside the container change?

	average kinetic energy	**pressure**
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

3 ○ and ● represent atoms of different elements.

Which diagram represents a mixture of compounds?

A



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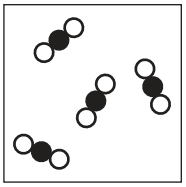

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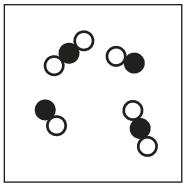
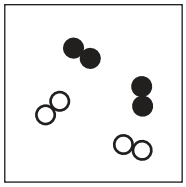


D



4 Which statement explains why water is a compound?

A Hydrogen and oxygen in water can only be separated using a chemical change.

B Hydrogen and oxygen in water can be separated using a physical change.

C The masses of hydrogen and oxygen combined in water are variable.

D Water has the same properties as both hydrogen and oxygen.

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5 The table shows the number of protons, neutrons and electrons in four different particles.

particle	protons	neutrons	electrons
W	17	18	17
X	16	18	18
Y	17	20	17
Z	18	20	18

Which two particles have the same chemical properties?

A W and X **B** W and Y **C** X and Z **D** Y and Z

6 Which statement explains why sodium chloride, NaC*l*, has a high melting point?

A NaC*l* contains strong ionic bonds.

B NaC*l* contains strong covalent bonds.

C NaC*l* contains strong intermolecular forces.

D NaC*l* contains strong metallic bonds.

7 Different forms of an element G are used as lubricants and in cutting tools.

What is the structure of G?

A giant covalent

B ionic

C metallic

D simple covalent

8 Which row shows the correct formulas of iron(II) bromide and zinc nitrate?

	iron(II) bromide	zinc nitrate
A	$FeBr_2$	$ZnNO_3$
B	$FeBr_2$	$Zn(NO_3)_2$
C	Fe_2Br	$ZnNO_3$
D	Fe_2Br	$Zn(NO_3)_2$

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9 Which statement defines relative molecular mass?

A the sum of the relative atomic masses

B the simplest whole number ratio of the different atoms in a molecule

C the number and type of different atoms in a molecule

D the average mass of the isotopes of an element compared to 1/12th of the mass of an atom of ^{12}C

10 The equation for the reaction between magnesium and dilute hydrochloric acid is shown.

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

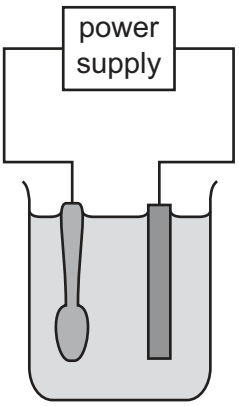
0.10 mol Mg is added to 100 cm^3 of 1.0 mol / dm^3 $HCl(aq)$.

The hydrogen produced is collected and its volume measured at room temperature and pressure.

What is the maximum volume of hydrogen produced?

A 0.05 dm^3 **B** 1.2 dm^3 **C** 2.4 dm^3 **D** 4.8 dm^3

11 The apparatus shown is used to electroplate a copper spoon with silver.



Which row is correct?

	anode	cathode	electrolyte
A	silver	copper spoon	aqueous silver nitrate
B	silver	copper spoon	aqueous copper(II) chloride
C	copper spoon	silver	aqueous silver nitrate
D	copper spoon	silver	aqueous copper(II) nitrate

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12 Dilute sulfuric acid is electrolysed using inert electrodes.

What is produced at the anode?

A hydrogen

B oxygen

C sulfur

D sulfur dioxide

13 Aqueous copper(II) sulfate is a blue solution. The solution is electrolysed using copper electrodes.

Which row describes the changes that take place during the electrolysis?

	mass of cathode	mass of anode	colour of solution
A	decreases	increases	becomes paler
B	decreases	increases	stays the same
C	increases	decreases	becomes paler
D	increases	decreases	stays the same

14 Nitrogen trifluoride, NF_3, is used in the manufacture of certain types of solar panels. The equation for the formation of nitrogen trifluoride is shown.

$$N_2 + 3F_2 \rightarrow 2NF_3$$

type of bond	bond energy in kJ / mol
N≡N	+950
F–F	+150
N–F	+280

Using the table of bond energies, what is the energy change for this reaction?

A –560 kJ / mol

B –280 kJ / mol

C +280 kJ / mol

D +3080 kJ / mol

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15 Ethanol and ethanoic acid react to form ethyl ethanoate and water.

$$CH_3CH_2OH + CH_3CO_2H \rightleftharpoons CH_3CO_2CH_2CH_3 + H_2O$$

Which statement explains why concentrated sulfuric acid is added to the reaction mixture?

A The position of equilibrium moves to the left-hand side.

B Sulfuric acid is a weaker acid than ethanoic acid.

C The total frequency of collisions decreases.

D Sulfuric acid acts as a catalyst for the reaction.

16 Which statement explains why increasing the concentration of a reactant increases the rate of reaction?

A There is a higher percentage of successful collisions between particles.

B The activation energy of the reaction decreases.

C There is a higher percentage of collisions involving particles with energy greater than the activation energy.

D There are more collisions per second between particles.

17 The Haber process is used to make ammonia.

The equation for the reaction is shown.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Which statements about the Haber process are correct?

1 The hydrogen used is made by reacting a metal with a dilute acid.

2 The nitrogen used is extracted from the air.

3 Hydrogen is extracted from methane.

4 The typical conditions for the Haber process are a pressure of 1.0 atm and an iron catalyst.

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

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18 The equation represents the reaction between sulfur dioxide and acidified potassium dichromate(VI).

$$3SO_2 + Cr_2O_7^{2-} + 2H^+ \rightarrow 3SO_4^{2-} + 2Cr^{3+} + H_2O$$

What is oxidised and what is the oxidising agent in this reaction?

	oxidised	**oxidising agent**
A	$Cr_2O_7^{2-}$	H^+
B	$Cr_2O_7^{2-}$	$Cr_2O_7^{2-}$
C	SO_2	$Cr_2O_7^{2-}$
D	SO_2	H^+

19 A known mass of magnesium is added to excess dilute hydrochloric acid.

The total volume of hydrogen produced is 70 cm^3.

The experiment is repeated using dilute ethanoic acid in place of dilute hydrochloric acid.

All other conditions are the same.

Which row gives the relative rate of the reaction and the total volume of hydrogen produced in the second experiment?

	relative rate of reaction	**total volume of hydrogen / cm^3**
A	faster	35
B	faster	70
C	slower	35
D	slower	70

20 Which products are formed when magnesium carbonate reacts with dilute hydrochloric acid?

A carbon dioxide, hydrogen and magnesium chloride

B carbon dioxide and magnesium chloride only

C carbon dioxide, water and magnesium chloride

D water and magnesium chloride only

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21 Dilute hydrochloric acid is titrated against aqueous sodium hydroxide.

At the start of the titration, dilute hydrochloric acid is added to a conical flask using a .....1.....

A few drops of methyl orange indicator are added to the dilute hydrochloric acid in the conical flask.

Aqueous sodium hydroxide is added .....2..... until the colour of the indicator just .....3.....

Which row completes the gaps 1, 2 and 3?

	1	2	3
A	burette	dropwise	disappears
B	burette	1 cm^3 at a time	changes
C	volumetric pipette	dropwise	changes
D	volumetric pipette	1 cm^3 at a time	disappears

22 Four aqueous substances are listed.

1 ammonium carbonate
2 calcium sulfate
3 potassium chloride
4 sodium nitrate

Which two substances, when added together, will give a precipitate?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

23 Which statements about the Periodic Table are correct?

1 The horizontal rows of the Periodic Table are called groups.
2 The Periodic Table is arranged in order of increasing proton number.
3 The elements in the second column from the left of the Periodic Table form ions with a charge of 2+.
4 Elements in a horizontal row of the Periodic Table become more metallic going from left to right.

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

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24 Which statement about alkali metals is correct?

A Lithium is denser than sodium.

B Sodium is more reactive than potassium.

C Sodium has a higher melting point than potassium.

D Potassium has more outer-shell electrons than sodium.

25 Which row describes the difference in malleability between alloys and pure metals and explains the difference?

	malleability of an alloy compared with pure metal	**explanation**
A	less malleable	different-sized atoms slide more easily over each other
B	less malleable	different-sized atoms slide less easily over each other
C	more malleable	different-sized atoms slide more easily over each other
D	more malleable	different-sized atoms slide less easily over each other

26 Aluminium does **not** react with dilute hydrochloric acid.

Zinc reacts with dilute hydrochloric acid to produce hydrogen gas.

Which statement explains these observations?

A Aluminium has a greater tendency than zinc to form positive ions.

B Only aluminium is coated with a layer of its oxide.

C Aluminium is above zinc in the reactivity series.

D Zinc has a greater tendency than aluminium to form positive ions.

27 Which equation represents the extraction of iron from hematite in a blast furnace?

A $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

B $FeO + CO \rightarrow Fe + CO_2$

C $2Fe_2O_3 \rightarrow 2Fe + 3O_2$

D $FeO + SiO_2 \rightarrow Fe + SiO_3$

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28 Aluminium is extracted from its ore by electrolysis using carbon electrodes.

Aluminium, oxygen and carbon dioxide are all produced during this process.

Which statement about this process is correct?

A Reduction of oxide ions happens at the carbon anode.

B Reduction of oxygen gas happens at the carbon anode.

C Reduction of oxide ions happens at the carbon cathode.

D Reduction of oxygen gas happens at the carbon cathode.

29 What is the equation for photosynthesis?

A $CO_2 + 3H_2 \rightarrow CH_3OH + H_2O$

B $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

C $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + CO_2$

D $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

30 Modern cars are fitted with catalytic converters.

Which statement about the catalysts in catalytic converters is correct?

A They remove nitrogen from the car's exhaust so that it **cannot** combine with oxygen.

B They combine with oxygen from the engine to prevent the formation of oxides of nitrogen.

C They remove oxides of nitrogen that are produced in the car engine.

D They are replaced regularly because they are used up.

31 Which row describes a strategy for reducing global warming and a strategy for reducing acid rain?

	strategy for reducing global warming	**strategy for reducing acid rain**
A	burning more wood	flue gas desulfurisation
B	decrease use of petroleum	increase use of coal for electricity generation
C	reduce livestock farming	use catalytic converters in vehicles
D	use low-sulfur fuels	reduce livestock farming

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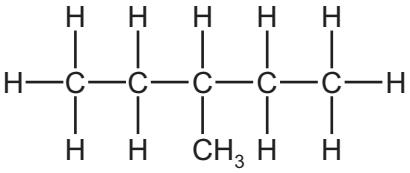
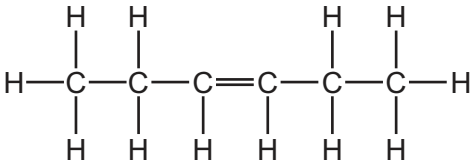
32 The formulas of two hydrocarbons are shown.





Which statement about these hydrocarbons is correct?

A They are both saturated.

B They are structural isomers of each other.

C They have the same general formula.

D They produce the same volume of carbon dioxide during complete combustion.

33 The names and structures of four organic compounds are shown.

propanoic acid	propene	propan-1-ol	propan-2-ol
$CH_3CHCOOH$	$CH_2{=}CH_2CH_3$	$CH_3CH_2CH_2OH$	$CH_3CH(OH)_2CH_3$

Which compound has the correct structure?

A propanoic acid

B propene

C propan-1-ol

D propan-2-ol

34 Which equation represents a substitution reaction?

A $CH_3CH_2Cl + Cl_2 \rightarrow CH_3CHCl_3 + HCl$

B $CH_3CH_2OH \rightarrow CH_2CH_2 + H_2O$

C $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

D $CH_2CH_2 + HBr \rightarrow CH_3CH_2Br$

35 Which compound reacts rapidly with bromine to produce $CH_3CHBrCHBrCH_3$?

A CH_3CH_2Br

B $CH_2{=}CHCH_2CH_3$

C $CH_3CH{=}CHCH_3$

D $CH_3CH_2CH_2CH_3$

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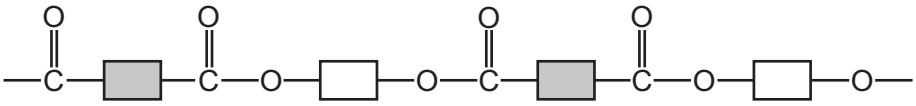
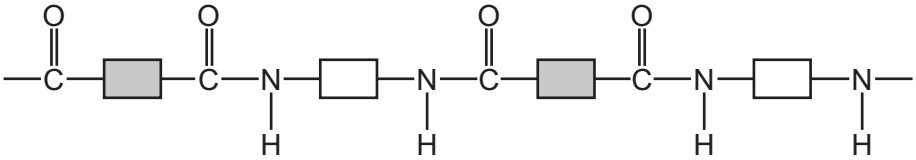
36 Which structure represents the polymer PET?

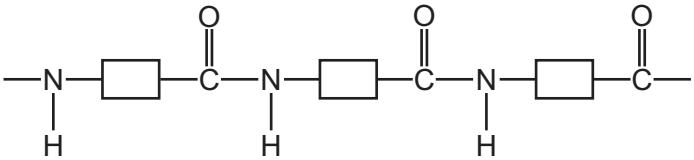
A



B



C



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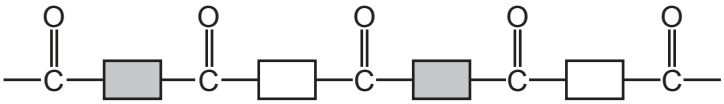
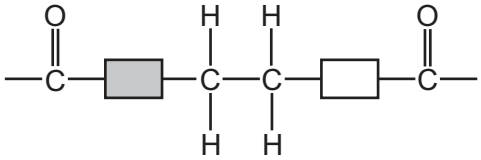


37 Which diagram shows the structure of nylon?

A



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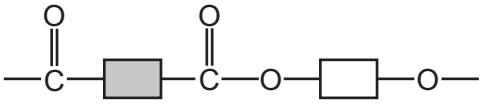

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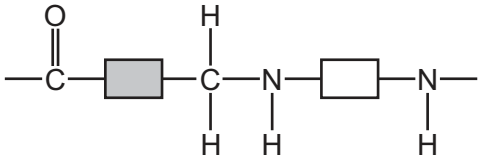

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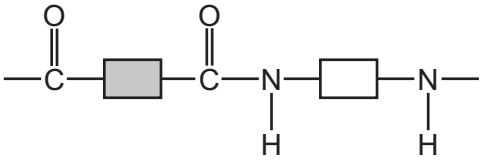

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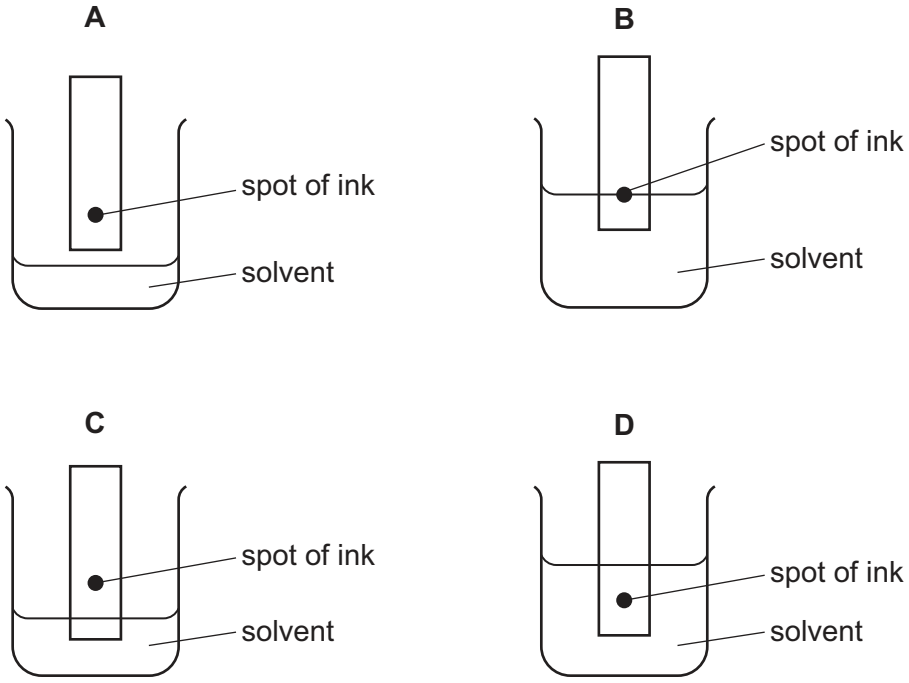
38 The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?



39 Which process is used to produce drinking water from sea water?

A crystallisation

B distillation

C filtration

D chlorination

40 A sample of an ionic compound produces an orange-red flame test colour.

Which metal ion is present in the compound?

A Li^+ **B** Cu^{2+} **C** K^+ **D** Ca^{2+}

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The Periodic Table of Elements

Key

atomic number
atomic symbol
name
relative atomic mass

Group

I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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

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