KAPSABET HIGH SCHOOL

233/2   (*Kenya Certificate of Secondary Education*)   **Paper 2**

INTERNAL MOCK EXAM
CHEMISTRY
(THEORY)

Dec. 2020– 2 Hours

Name……………………………………………… Index No………………………………………………………

Adm No…………………………………………… Date:……………………………………………………

Signature …………………………………………… Stream:………………………………………………

Instructions to candidates

a) Write your Name, Index, Admission number and stream in the spaces provided above.
b) Sign and write the examination date on the spaces provided above.
c) Answer all the questions in the spaces provided.
d) All workings **must** be clearly shown where necessary.
e) KNEC mathematical tables and non-programmable silent electronic calculators may be used.
f) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
g) **Candidates must answer the questions in English.**

For Examiners use only

Question	Maximum Score	Candidate's Score
1	10	
2	13	
3	10	
4	13	
5	11	
6	10	
7	13	
Total Score	**80**	

1. a) Define radioactivity   (1mark)

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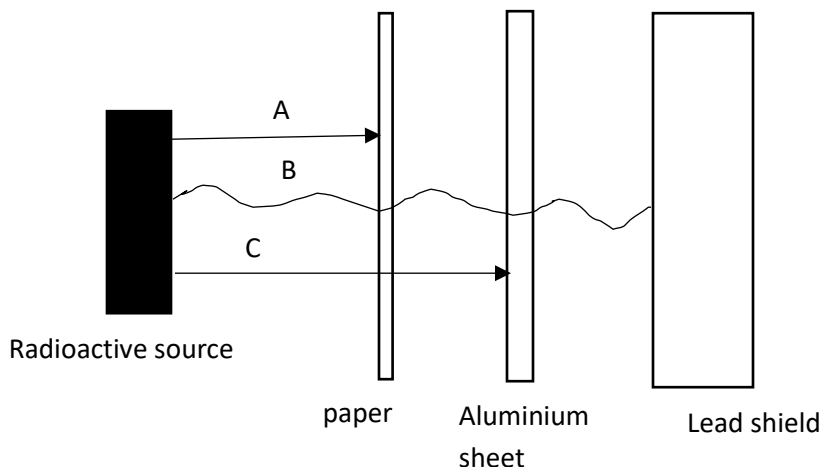...

2. b) Give two differences between chemical reactions and nuclear reactions. (2marks)

Chemical reactions	Nuclear reactions

c) Study the diagram below and answer the questions that follow

Radioactive source

paper   Aluminium   Lead shield
             sheet

i)   What property of radiations is being investigated by the illustration above   1mark)

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ii)   Give the name of the radiation B and give a reason.   (1mark)

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iii)   B below is the radioactive decay starting with $^{214}_{83}Bi$, study it and answer the questions that

        follow.

$^{214}_{83}Bi$ →(Step I)→ $^{214}_{84}Po$ →(Step II)→ $^{210}_{82}Pb$ →(Step III)→ $^{210}_{83}Bi$

Step IV ↓

←(Step V)— $^{210}_{84}Po$

$^{206}_{82}Pb$
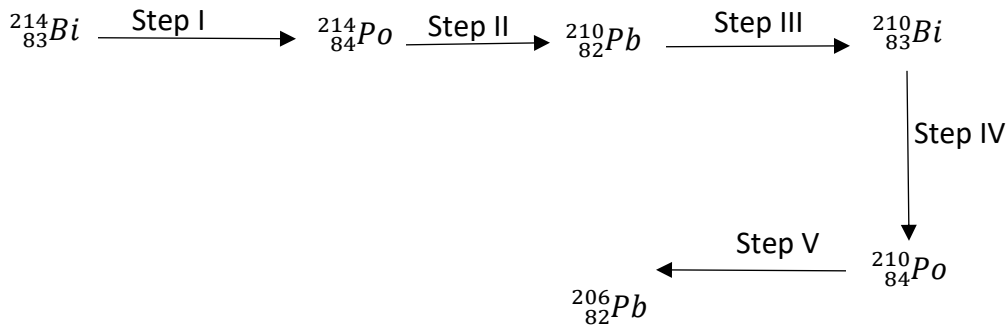
i) Identify the radiations emitted at:

    I. Step I ………………………………………………………………………… (1mark)

    II. Step V ………………………………………………………………………… (1mark)

ii) Write a nuclear equation for step II (1mark)

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e) State one danger associated with frequent exposure to radiations.　　　　　(1mark)

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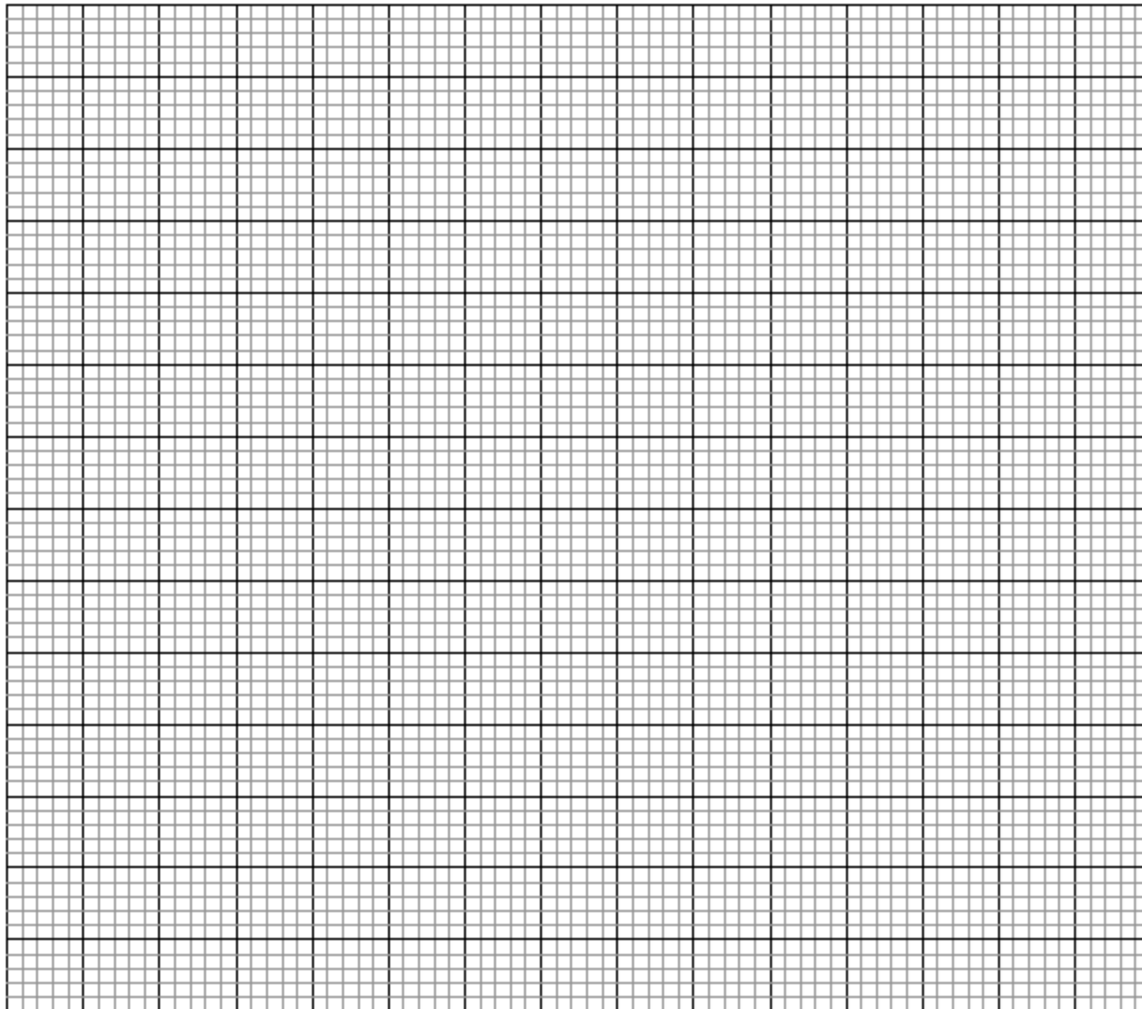……………………………………………………………………………………………………

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3. a) The amount of salt A that can dissolve in water at different temperatures is shown in the table below

Temperature (^{o}C)	0	10	20	30	40	60	80	90
Solubility of salt A g/100g of water.	36.1	35.5	34.8	34.2	33.7	32.6	31.4	30.9

i) Draw a graph of solubility of salt A against temperature.　　　　　(3marks)

ii)   How does solubility of salt A vary with temperature?   (1mark)

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iii)   From the graph determine the:
        I.   Solubility when the temperature would be 50^0C (1mark)

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        II.   Temperature at which the solubility will be 31.8g/ 100g of water. (1mark)

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iv)   State one industrial application of solubility   (1mark)

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b) The flow chart below shows industrial manufacture of sodium carbonate by solvay process. Study it and answer the questions that follow.
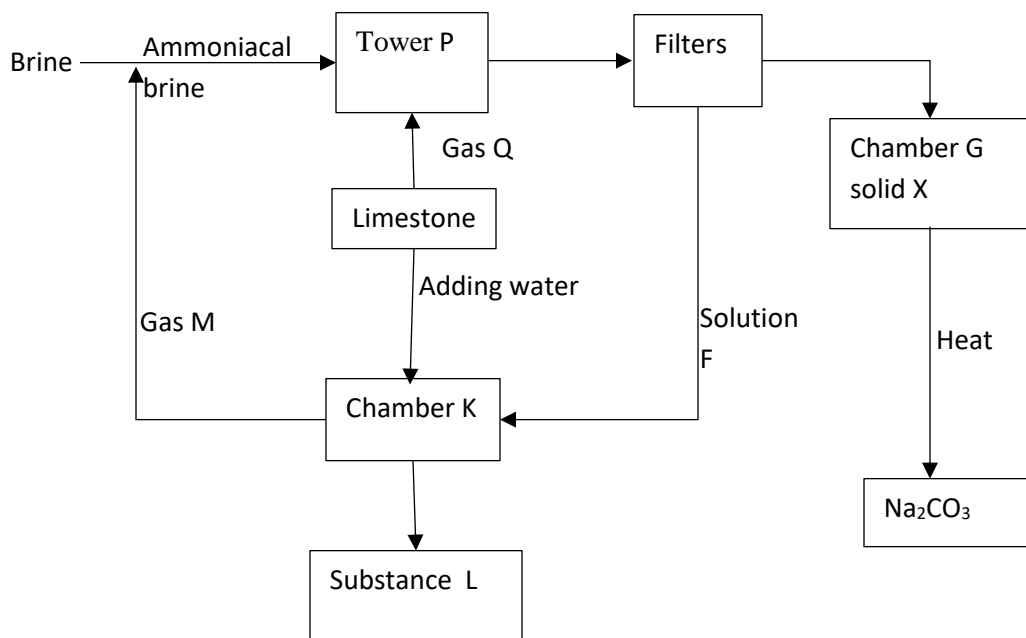
i)   Name
       I.   Gas Q …………………………………………………………… (½mark)

       II.   Gas M …………………………………………………………. (½mark)

       III.   Solution F …………….…………………………………………. (½mark)

       IV.   Substance L ………………………………………………………… (½mark)

ii)   Write equations for the reactions that occurred;
       I.   Chamber K   (1mark)

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       II.   Heating solid X   (1mark)

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iii)   Give one use for each of the compounds:
       I.   Substance L   (1mark)

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II. Na_2CO_3 (1mark)

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4. a) The diagram below was a setup used by a form three student in Kapsabet Boys to prepare, dry and collect hydrogen chloride gas.
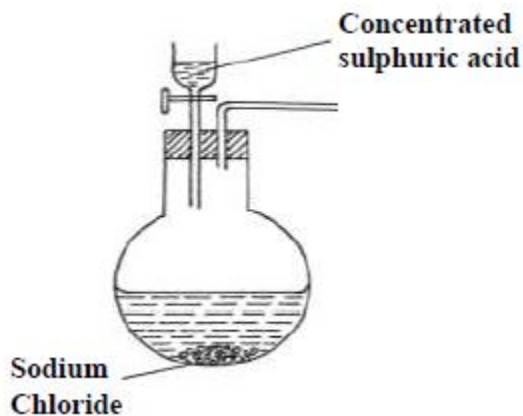
i)   Complete the diagram to show how a sample of hydrogen chloride gas was prepared, dried and collected.   (3marks)

ii)   Write a balanced chemical equation to shows how hydrogen chloride is formed in the flask.   (1mark)

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b) Dry hydrogen chloride gas was passed through hot iron filings as shown below.
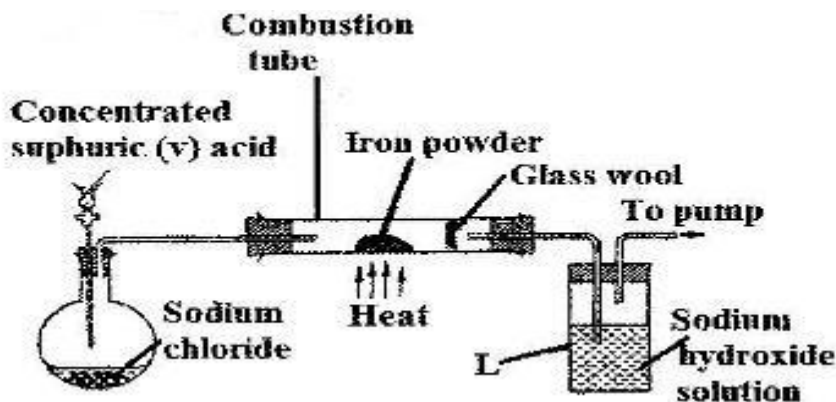
i)   State and explain observation that would be made in the combustion tube.   (2marks)

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ii) What is the purpose of having sodium hydroxide in beaker labelled L.   (1mark)

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iii) In the experiment above 600cm^3 of hydrogen chloride gas were used completely. Determine the mass of the product that would be formed in the combustion tube.
(Fe = 56.0, Cl =35.5, Molar Gas Volume =22.4 litres at s.t.p)   (3marks)

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5. a) A sample of an ore was suspected to have a compound of iron, describe how it can be established that the ore contains iron.   (3marks)

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b) The diagram below represents a blast furnace used in the extraction of iron. Study it and answer the questions that follow.
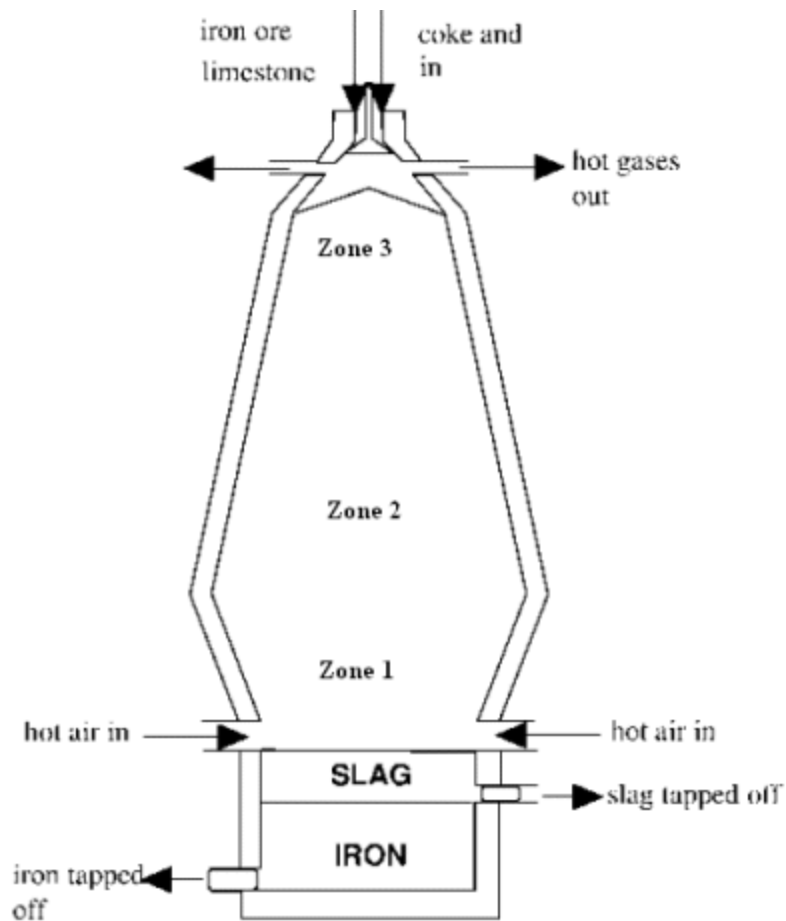
i) Name two ores from which iron can be extracted. (2marks)

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ii) Write chemical equations for the reactions that occur in the zones:
Zone 1 (1mark)

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Zone 2 (1mark)

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Zone 3 (1mark)

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iii) What are the two impurities found in the ore of iron? (1mark)

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iv)   Using chemical equations explain how the impurities are removed from the ore.   (3marks)

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v)   State the effect of the gases produced in this process on the environment. (1mark)

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6. a) The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters used are not the actual symbols of the elements.

				N		S		
K	Q		O			P	F	M
	R							

i)   What name is given to the group of elements to which Q and R belong? (1mark)

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ii)   Write a chemical equation for the reaction that would occur when R and F react.   (1mark)

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iii)   Compare the atomic radius of O and P.   (2marks)

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iv)   Draw a dot (.) and across (X) diagram for the compound formed between N and F   (2marks)

v) Describe how a pure sample of carbonate of K can be obtained from a mixture with lead (II) carbonate. (3marks)

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b) The melting point of silicon (IV) oxide is 1728°C while that of sulphur (IV) oxide is -76°C. Explain (2marks)

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7. a) Draw and give names of the structures of the compounds below.
   $CH_3CHCHCH_3$ (1mark)

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   $CH_3CH_2CH_2COOH$ (1mark)

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b) The formular below represent a type of detergent.
   $C_{17}H_{35}COONa$
   i) Name the type of detergent represented (1mark)

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   ii) Give one advantage and one disadvantage of using the detergent in (i) Above. (2marks)

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c) Compound P whose formular is given below was a product of a reaction between compound M and compound N.

   $CH_3CH_2C00CH_2CH_3$

i)   Draw the structures of compounds M and N
     M   (1mark)

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     N   (1mark)

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ii) Name the process that took place for formation of compound P. State the conditions

     necessary for the process named.   (2marks)

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d) Compound Q has empirical formula CH_2 and molecular mass 42:
i)   Determine the Molecular mass of Q.   (1mark)

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ii) Draw a structure of polymer having three units of the structure in i)   (1mark)

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a) The diagram below was used in electrolysis of lead (II) bromide. Study it and answer the questions that follow.
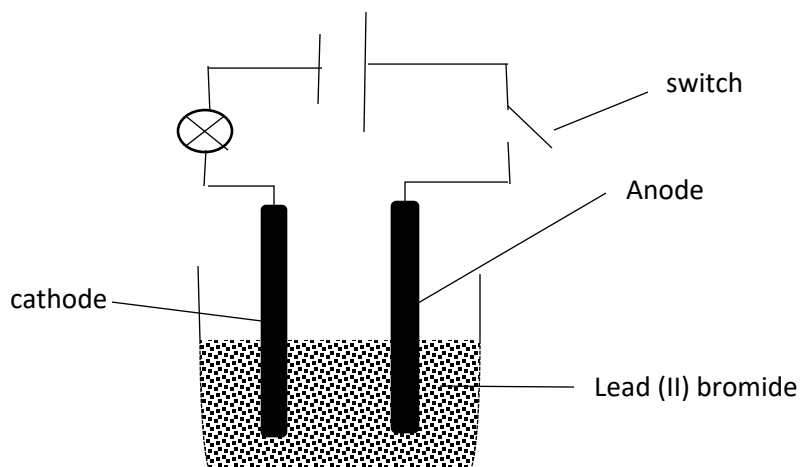
After the switch was closed, the bulb did not light. Explain.   (1mark)

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i)   Write ionic equations for the reactions that occurred at:
     I anode   (1mark)

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     II Cathode   (1mark)

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ii) State the precaution that should be taken during carrying out this
     experiment.   (1mark)

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iii) During the electrolysis above 51.75g of lead was deposited in 3hours, determine the
     amount of current that was used.(1F= 96500 coulombs,
     Pb = 207)   (3marks)

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b) Use the reduction potentials given below to answer the questions that follow.

Reaction	$E^{\ominus}$ (volts)
$A^{2+}(aq) + 2e^- \rightarrow A(s)$	-0.76
$B^{2+}(aq) + 2e^- \rightarrow B(aq)$	-0.44
$C^+(aq) + e^- \rightarrow C_2(g)$	0.00
$D^{2+}(aq) + 2e^- \rightarrow D(s)$	+0.34
$\frac{1}{2}E_2(g) + e^- \rightarrow E^-(aq)$	+1.09

i) Identify the strongest reducing agent. Give a reason. (1mark)

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ii) Give two half-cell reactions that would produce the largest e.m.f when connected.

(1mark)

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iii) Draw and label an electrochemical cell that can be obtained when the two half-cell reactions mentioned above would be connected (3marks)

iv) Is it possible to store a solution containing ions of A in a container made of B? (1mark)

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