

R_{OYGBIV}

+



[71 marks]

625
74
841



KU 27/35

Communication [9 marks] 1

1. What is a salt bridge? What two purposes does it serve? [3 marks]

A salt bridge is a ^{glass tube w/ electrolyte} galvanic cell or an electrolytic cell and it runs from one beaker to the other and pumps negative charges (like NO₃⁻) into the anode because e⁻ are leaving the anode, and it pumps + charges into the cathode b/c e⁻ are coming in to the cathode → this maintains electrical neutrality.
- Closes the circuit too

2. Fill in the following table. [6 marks]

	Galvanic Cells	Electrolytic Cells
Spontaneity	Spontaneous ✓	Nonspontaneous ✓
Sign of E _{cell}	+	- ✓
Oxidation Occurs at the ...	Anode ✓	Anode ✓
Direction of Electron Movement	from <u>anode</u> to <u>cathode</u> ✓	from <u>anode</u> to <u>cathode</u> ✓
Describe the scientific process occurring in the cell.	Chemical nrg is made into electrical ✓	Electrical energy is made into chemical - energy is provided because it is not spontaneous - uses electrolysis to force the energy to be made

Making Connections [4 marks] 35

3. Are metals usually oxidizing agents or reducing agents? Explain your reasoning fully. [3 marks]

Metals usually have positive charges, which means they have lost electrons. Since LEO says GER, a loss of electrons is oxidation. If metals undergo oxidation, then they are reducing agents

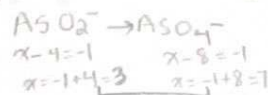
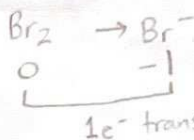
Explain the title of this test. [1 marks]

0.5
Reduction (like a cow) → Oxidation
Red Ox

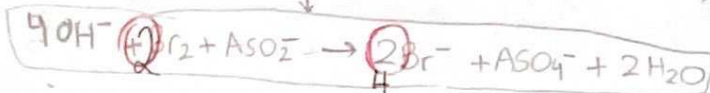
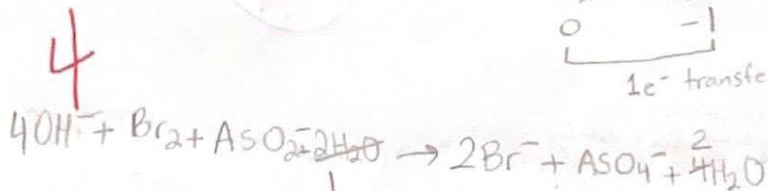
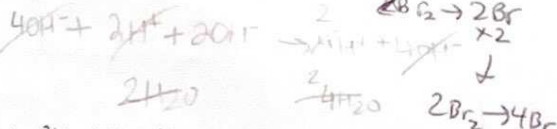
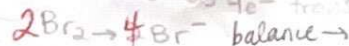
• Which is most easily oxidized

Inquiry [26 marks]

5. Balance the following equation, in basic solution, using the oxidation number method. [5 marks]



but x2 b/c As has 4e⁻ transferred.



6. In an experiment, the following electrochemical cell is set up: Fe(s) | Fe²⁺(aq) || Ag⁺(aq) | Ag(s).

(a) Draw a diagram of this cell. Include beakers, salt bridge (with sodium nitrate), labeled electrodes, labeled electrolytes, external circuit and voltmeter. [4 marks]

(b) Indicate the direction of electron flow on the diagram. [1 mark]

(c) Indicate the direction of ion flow from the salt bridge on the diagram. [2 marks]

(d) Label anode and cathode, under the correct compartment, on the diagram. [2 marks]

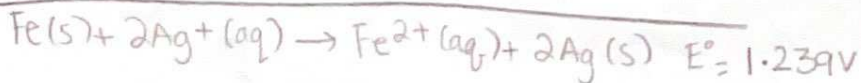
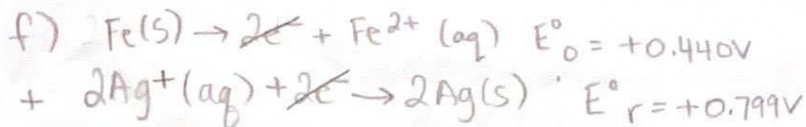
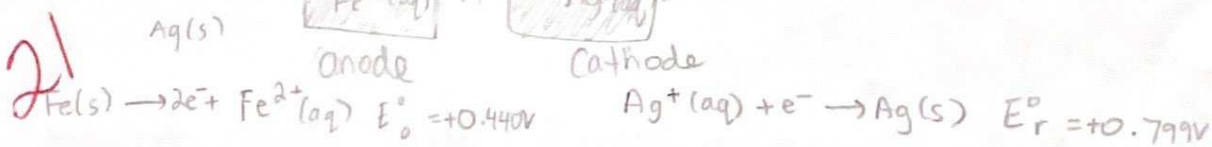
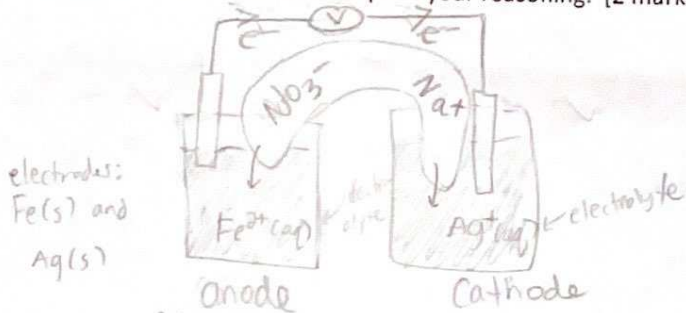
(e) Write out the half cell reactions occurring in each compartment, under the appropriate compartment. [4 marks]

(f) Write out the net cell reaction. [2 marks]

(g) Label the oxidizing and reducing agents in the net cell reaction. [2 marks]

(h) Calculate E^o_{cell}. [2 marks]

(i) Is this reaction spontaneous? Explain your reasoning. [2 marks]



g) Fe(s) → reducing agent
Ag⁺(aq) → oxidizing agent

h) Calculated above as 1.239V

i) Yes → the E^o is a + value → this is a galvanic cell and spontaneous