

# HW03

## Question 1

1 pts

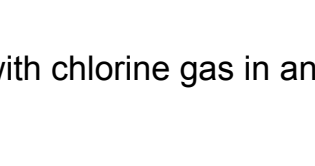
What is the coefficient of lead (Pb) in the redox reaction after the following half-reactions are balanced?




## Question 2

1 pts

What is the sum of coefficients in the redox reaction after the following half-reactions are balanced?




## Question 3

1 pts

In the reaction of thiosulfate ion with chlorine gas in an acidic solution, what is the reducing agent?



- Cl
- S<sup>2+</sup>
- S<sub>2</sub>O<sub>3</sub><sup>2-</sup>
- Cl<sub>2</sub>

## Question 4

1 pts

Based on the push and pull of electrons in a redox reaction, it can be inferred that the species being oxidized is also the...

- reducing agent
- strong acid
- oxidizer
- oxidizing agent

## Question 5

1 pts

What is the change in oxidation number of sulfur when SO<sub>3</sub> reacts to form SO<sup>-</sup> in a redox reaction?

## Question 6

1 pts

When Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> reacts to form Cr(OH)<sub>3</sub>, the Cr atom gets \_\_\_\_\_ and the change in oxidation number is equal to \_\_\_\_\_.

- reduced, -6
- oxidized, +3
- reduced, +3
- oxidized, -6
- reduced, -3

## Question 7

1 pts

What is the oxidation number of chlorine in ClO<sub>4</sub><sup>-</sup>?

## Question 8

1 pts

What is the oxidation number of sulfur in SO<sub>4</sub><sup>2-</sup>?

## Question 9

1 pts

What is the oxidation number of an individual sulfur in thiosulfate, S<sub>2</sub>O<sub>3</sub><sup>2-</sup>?

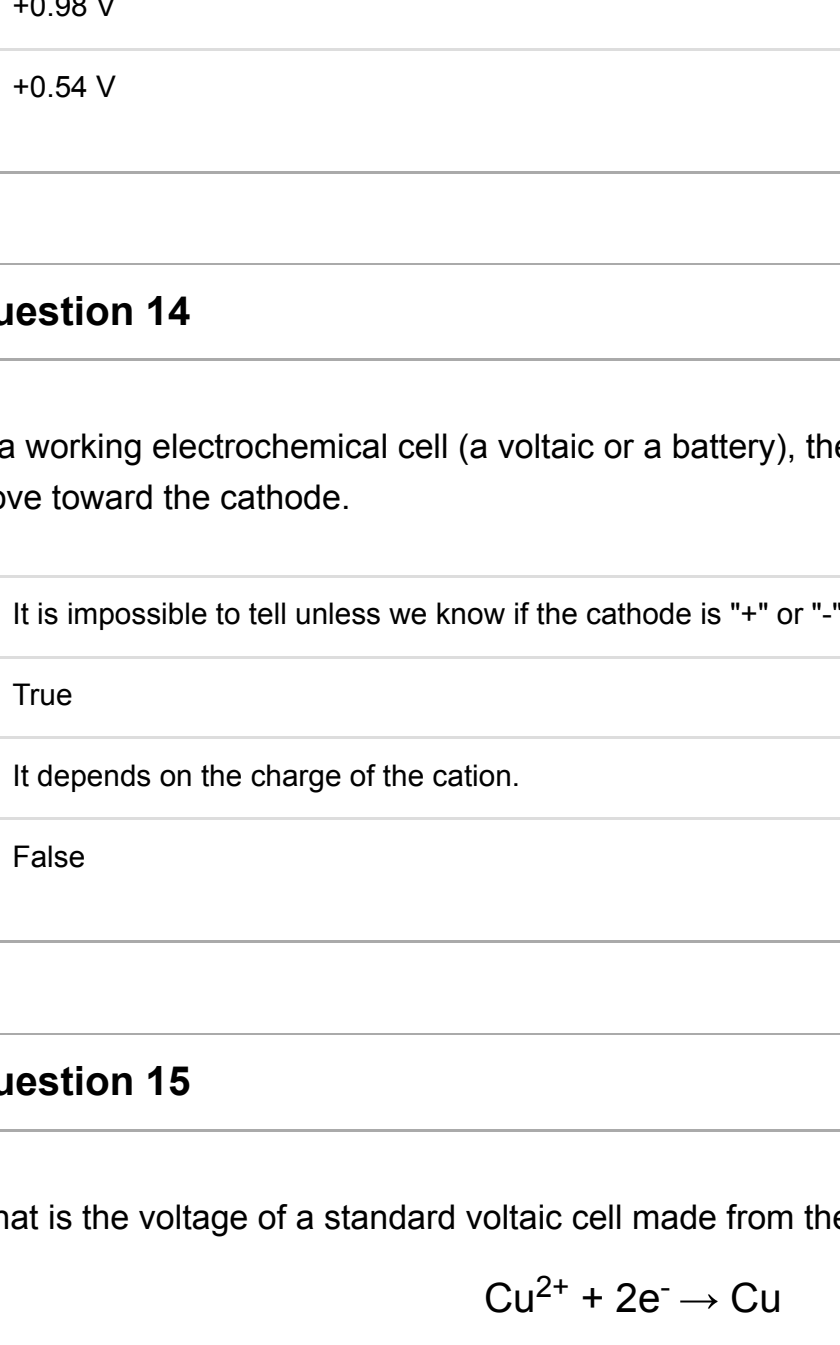
## Question 10

1 pts

What is the oxidation number of phosphorus in hydrogen phosphate, HPO<sub>4</sub><sup>2-</sup>?

## Question 11

1 pts



In this electrochemical cell, what is the reduction half reaction?

- Zn<sup>2+</sup>(aq) + 2e<sup>-</sup> → Zn(s)
- Zn(s) → Zn<sup>2+</sup>(aq) + 2e<sup>-</sup>
- Cu<sup>2+</sup>(aq) + 2e<sup>-</sup> → Cu(s)
- Cu(s) → Cu<sup>2+</sup>(aq) + 2e<sup>-</sup>

## Question 12

1 pts

Consider the cell reaction represented by the skeletal equation:



What is the proper cell diagram for this reaction?

- Ti<sup>2+</sup>(aq) | Ti(s) || Mn(s) | Mn<sup>2+</sup>(aq)
- Mn<sup>2+</sup>(aq) | Mn(s) || Ti(s) | Ti<sup>2+</sup>(aq)
- Mn(s) | Mn<sup>2+</sup>(aq) || Ti<sup>2+</sup>(aq) | Ti(s)
- Ti(s) | Ti<sup>2+</sup>(aq) || Mn<sup>2+</sup>(aq) | Mn(s)

## Question 13

1 pts

Consider the cell:



Calculate E°.

- 1.20 V
- +1.20 V
- +0.98 V
- +0.54 V

## Question 14

1 pts

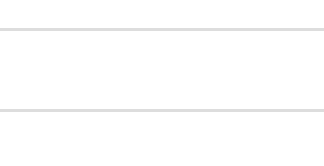
In a working electrochemical cell (a voltaic or a battery), the cations in the salt bridge move toward the cathode.

- It is impossible to tell unless we know if the cathode is "+" or "-".
- True
- It depends on the charge of the cation.
- False

## Question 15

1 pts

What is the voltage of a standard voltaic cell made from the following half-reactions?



- 2.70 V
- 2.02 V
- 2.02 V
- 2.70 V

## Question 16

1 pts

For the cell in the previous question, identify the solid anode and cathode.

- Cu: cathode  
Mg: anode
- Cu: anode  
Mg: cathode

## Question 17

1 pts

What is the voltage of a standard electrolytic cell made from the following half-reactions?



- 2.46 V
- 1.66 V
- 0.86 V
- 2.46 V
- 0.86 V

## Question 18

1 pts

Use the following table for the next three questions:

F <sub>2</sub> + 2e <sup>-</sup>	⇌	2F <sup>-</sup>	+2.87 V
Pb <sup>4+</sup> + 2e <sup>-</sup>	⇌	Pb <sup>2+</sup>	+1.67 V
Cl <sub>2</sub> + 2e <sup>-</sup>	⇌	2Cl <sup>-</sup>	+1.36 V
Ag <sup>+</sup> + e <sup>-</sup>	⇌	Ag	+0.80 V
Fe <sup>3+</sup> + e <sup>-</sup>	⇌	Fe <sup>2+</sup>	+0.77 V
Cu <sup>2+</sup> + 2e <sup>-</sup>	⇌	Cu	+0.34 V
2H <sup>+</sup> + 2e <sup>-</sup>	⇌	H <sub>2</sub>	0.000 V
Fe <sup>3+</sup> + 3e <sup>-</sup>	⇌	Fe	-0.04 V
Pb <sup>2+</sup> + 2e <sup>-</sup>	⇌	Pb	-0.13 V
Fe <sup>2+</sup> + 2e <sup>-</sup>	⇌	Fe	-0.44 V
Zn <sup>2+</sup> + 2e <sup>-</sup>	⇌	Zn	-0.76 V
Al <sup>3+</sup> + 3e <sup>-</sup>	⇌	Al	-1.66 V
Mg <sup>2+</sup> + 2e <sup>-</sup>	⇌	Mg	-2.36 V
Li <sup>+</sup> + e <sup>-</sup>	⇌	Li	-3.05 V

Which out of the following is the strongest reducing agent?

- Mg
- Ag<sup>+</sup>
- Li<sup>+</sup>
- Zn
- Ag

## Question 19

1 pts

What is the standard cell potential for the strongest battery possible using the table? Note: for this question, only compare standard cell potential to assess the strength of the battery.

- 2.87 V
- 0.00 V
- 3.05 V
- 5.92 V

## Question 20

1 pts

If you wanted to spontaneously reduce Al<sup>3+</sup> to form Al, you should pair it with...

- the oxidation of Pb
- the S.H.E reaction
- the reduction of Mg
- the oxidation of Mg

## Question 21

1 pts

In a voltaic cell...

- electrical energy is used to reverse spontaneous chemical reactions
- oxidation takes place at the cathode
- oxidation and reduction take place at the same time, but at different electrodes
- electrolytes are added to carry electrons between electrodes

## Question 22

1 pts

A discharging battery is a voltaic cell, meaning it is...

- non-spontaneous with a positive cell potential
- spontaneous with a negative cell potential
- non-spontaneous with a negative cell potential
- spontaneous with a positive cell potential