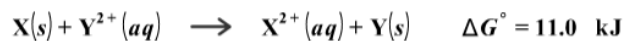


Electrochemistry

12.

Calculate the standard potential, E° , for this reaction from its ΔG° value.



$E^\circ =$ V

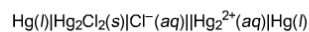
17.

A galvanic (voltaic) cell consists of an electrode composed of nickel in a 1.0 M nickel(II) ion solution and another electrode composed of copper in a 1.0 M copper(II) ion solution, connected by a salt bridge. Calculate the standard potential for this cell at 25 °C. Standard reduction potentials can be found [here](#).

$E^\circ_{\text{cell}} =$ V

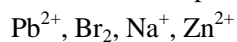
18.

Predict the standard potential for the galvanic cell. Standard reduction potentials can be found [here](#).



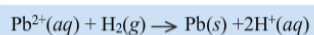
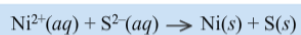
V

19. Rank these species by their ability to act as an oxidizing agent.



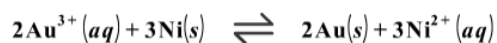
20.

Based on the sign of E°_{cell} , classify these reactions as spontaneous or nonspontaneous as written. Assume standard conditions.



21.

Calculate the standard free-energy change for the following reaction at 25 °C. Standard reduction potentials can be found [here](#).



$\Delta G^\circ =$ kJ

22.

Using a [table of standard reduction potentials](#), determine the best answer to the following questions.

a) Which of the following reagents would oxidize Fe to Fe²⁺, but not Pb to Pb²⁺?

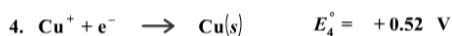
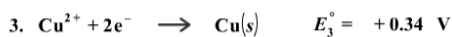
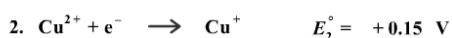
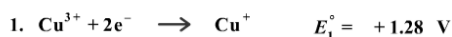
- Co
- Ca²⁺
- Co²⁺
- Br⁻
- Ca
- Br₂

b) Which of the following reagents would oxidize Ag to Ag⁺, but not F⁻ to F₂?

- Co²⁺
- Ca²⁺
- Co
- Ca
- Br⁻
- Br₂

23.

Given the following half-reactions and their respective standard reduction potentials



calculate the standard reduction potential for the reduction half-reaction of Cu(III) to Cu(II).



$E^\circ =$

V

24.

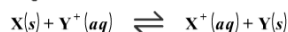
Complete this table relating the values of E°_{cell} and ΔG° to K .

K	E°_{cell}	ΔG°

> 0 = 0 < 0

26.

Consider a generic redox reaction



then suppose that the coefficients in the redox reaction are doubled.

How will the following quantities be affected for a voltaic cell under nonstandard conditions?

Doubled	Halved	Squared	No Change

Note that n is written as v_e or z in some textbooks

N, Q, E, lnQ, E⁰

27.

What would the potential of a standard hydrogen electrode (S.H.E.) be if it was under the following conditions?

$$[\text{H}^+] = 0.57 \text{ M} \quad P_{\text{H}_2} = 3.1 \text{ atm} \quad T = 298 \text{ K}$$

Number	V
<input type="text"/>	

28.

For the following electrochemical cell



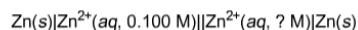
write the net cell equation. Phases are optional. Do not include the concentrations.

Calculate the following values at 25.0 °C using [standard potentials](#) as needed.

$E_{\text{cell}}^\circ =$	Number	V	$\Delta G_{\text{rxn}}^\circ =$	Number	kJ / mol
	<input type="text"/>			<input type="text"/>	
$E_{\text{cell}} =$	Number	V	$\Delta G_{\text{rxn}} =$	Number	kJ / mol
	<input type="text"/>			<input type="text"/>	

29.

The voltage generated by the zinc concentration cell described by,



is 25.0 mV at 25 °C. Calculate the concentration of the $\text{Zn}^{2+}(\text{aq})$ ion at the cathode.

Number	M
<input type="text"/>	

30.

When an ion-selective electrode for X^+ was immersed in 0.0510 M XCl , the measured potential was 0.0370 V. What is the concentration of X^+ when the potential is 0.0520 V? Assume that the electrode follows the Nernst equation, the temperature is at 25°C, and that the activity coefficient of X^+ is 1.

Number	M
$[\text{X}^+] =$	<input type="text"/>

35.

A current of 3.89 A is passed through a $\text{Pb}(\text{NO}_3)_2$ solution. How long (in hours) would this current have to be applied to plate out 7.60 g of lead?

Number	h
<input type="text"/>	

36.

Current is applied to a molten mixture of AgF , ZnCl_2 , and CaS . Standard potentials may be found [here](#).

What is produced at the cathode?

Ag
Ca
F₂
S
Zn
Cl₂

What is produced at the anode?

Ca
Zn
Cl₂
S
F₂
Ag