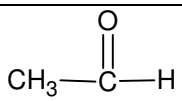
SIC 102
Quiz I

Rank the following compounds in terms of increasing melting point:

Compound	Structure
Acetaldehyde	
Ethanol	CH_3CH_2OH
Ethane	CH_3CH_3

Be sure to explain your reasoning and to explain how intermolecular forces relate to melting point.

SIC 102
Quiz II

Concentrated ammonia contains 247.5 g of NH_3 per liter of aqueous solution. The density of ammonia is 0.90 g / mL and the molar mass of ammonia is 17.03 g / mol.

1. What is the molarity of concentrated ammonia?

2. In order to perform an experiment, a 1 M solution of ammonia is required. What volume of concentrated ammonia is required to make 2.00 L of 1 M NH_3 solution?

SIC 102
Quiz III

Nitric acid reacts with calcium hydroxide.

1. Write a balanced chemical equation for this reaction.

2. Identify which species reacts as an acid, which species reacts as a base, which species is the conjugate acid, and which species is the conjugate base.

3. 25.00 mL of a calcium hydroxide solution of unknown concentration reacts completely with 22.85 mL of a 0.0108 M nitric acid solution. What is the concentration of the calcium hydroxide?

SIC 102
Quiz IV

Suppose you have a solution of 0.0065 M KOH.

1. What is the concentration of $[OH^-]$ in the solution? How do you know this?

2. What is the concentration of $[H^+]$ in solution? Recall that $K_w = 1.00 \times 10^{-14}$.

3. What is the pH of 0.0065 M potassium hydroxide solution?

4. Would you expect the pH of 0.0065 M ammonia to be higher or lower than the pH of 0.0065 M KOH? Explain.

SIC 102
Quiz V

In the gas phase, nitrosyl chloride is in equilibrium with nitric oxide and chlorine:

$$2\ NOCl(g) \Leftrightarrow 2\ NO(g) + Cl_2(g)$$

1. Write an equilibrium expression that relates the concentrations of reactants and products to the equilibrium constant.

2. The equilibrium constant for this reaction is $K_{eq} = 1.6 \times 10^{-5}$ mol / L. What does this tell you about the position of the equilibrium?

3. At equilibrium, a flask contains [NOCl] = 0.3347 M and [NO] = 0.0153 M. What is the concentration of chlorine in the flask?

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Quiz VI

Formic acid reacts with bromine to produce carbon dioxide and bromide according to this unbalanced reaction:

$$H_2CO_2(aq) + Br_2(aq) \rightarrow CO_2(g) + Br^-(aq)$$

1. Assign oxidation states to all atoms in this reaction.

2. Identify which atom is getting oxidized and which atom is getting reduced.

3. Identify which species is the oxidizing agent and which species is the reducing agent.

4. Using the method of half-reactions, balance this chemical equation.

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Quiz VII

Hydrazine reacts with cerium (IV) to produce hydroxylamine and cerium (III) in this unbalanced equation:

$$N_2H_4(aq) + Ce^{4+}(aq) \rightarrow NH_2OH(aq) + Ce^{3+}(aq)$$

1. Assign oxidation states to all atoms.

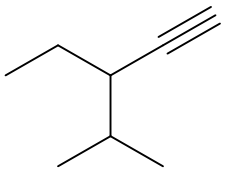
2. Identify which species reacts as an oxidizing agent and which species reacts as a reducing agent.

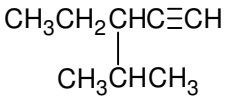
3. Using the method of half-reactions, balance this equation.

4. What mass of $N_2H_4(aq)$ is necessary to produce 5.00 mol of $Ce^{3+}(aq)$? The molecular weight of hydrazine is 32.05 g/mol.

SIC 102
Quiz VIII

1. Provide an unambiguous systematic name for the compound below, shown as both a line-angle drawing and a structural formula.





2. Draw the structure of the compound 4-ethyl-2,3-dimethyl-2-hexene. You may use either a line-angle diagram or a structural formula.

SIC 102
Quiz IX

For each question, draw the structure of an organic molecule with the desired functional group that has *exactly* four carbon atoms. Provide an unambiguous, systematic name for each molecule.

1. Alcohol

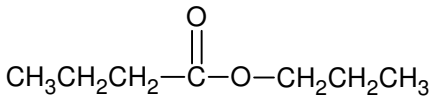
2. Ether

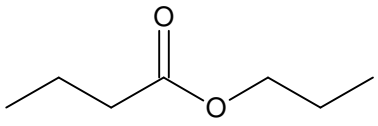
3. Amine

SIC 102
Quiz X

1. Using a structural formula or line-angle drawing, draw the structure of the compound 5-amino-2-methyl-3-hexanone.

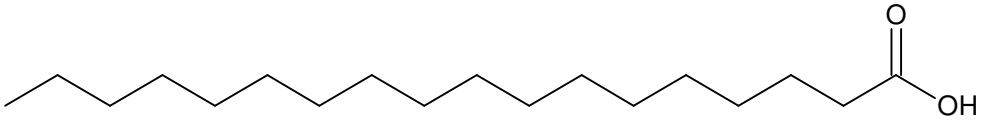
2. Provide an unambiguous, systematic name for the compound below, shown as both a structural formula and line-angle drawing.





SIC 102
Quiz XI

Stearic acid is an 18-carbon long commonly occurring fatty acid.



stearic acid

1. Draw the structure of the triglyceride formed from glycerol and three molecules of stearic acid.

2. Is this lipid saturated or unsaturated? How can you tell?

3. Would you expect this lipid to be a solid (fat) or liquid (oil)? Explain.