

Welcome to Jeff's CHEM 4 lecture!

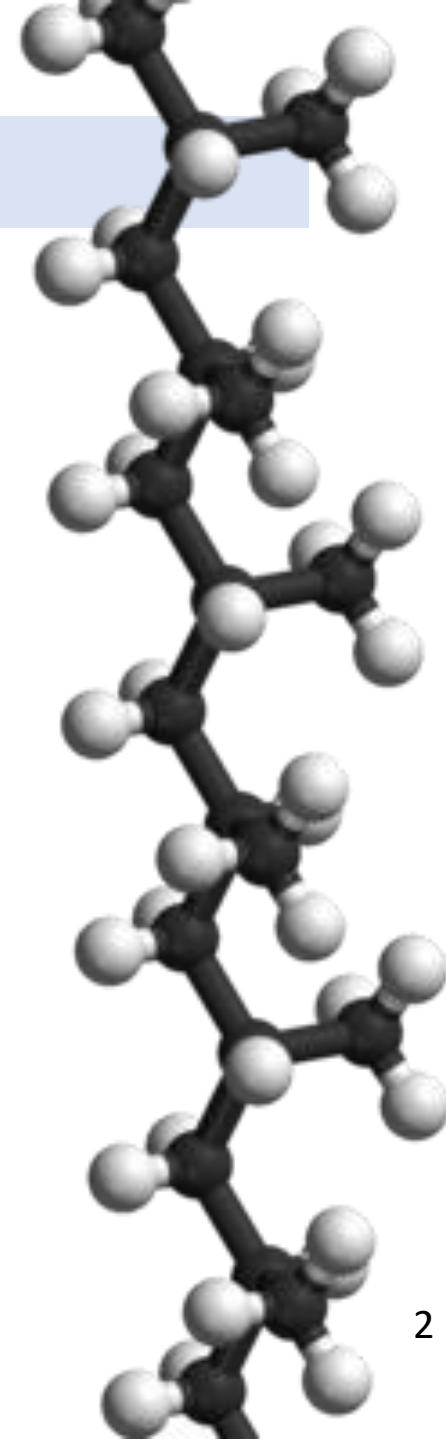
We'll be starting in just a bit...

While you are waiting:

- 1) Go to [LearningCatalytics.com](https://learningcatalytics.com) to prepare for today's clicker questions. Login with your MasteringChemistry login. **Session ID = 82407234**
 - 2) Make sure your Zoom User ID is your "first name last name". You can open "participants", then find your name and click on it to change it.
 - 3) When I need to cheer up, I like to listen to the music I heard my parents play in the house when I was growing up. Yesterday, I was listening to Yusuf/Cat Stevens' *Peace Train*. It has a great message and I thought it would be nice to share it with all of you. *Let us know in the chat... what is your favorite music (artist or song) to cheer you up or empower you?*
-

Are up keeping up with CHEM 4?

- ✓ **CHEM 4 Website:** tinyurl.com/SacStateChem4
 - ✓ Check **Aug/Sept calendar** for PowerPoint slides, readings, and homework.
- ✓ **Help:**
 - ✓ Jeff's office hours: MWF 9 – 9:30 am and 11 – 11:30 am; and by appointment
 - ✓ PAL office hours: link is on our CHEM 4 website
 - ✓ Can email me questions: Show question and email picture of work
- ✓ **Homework:**
 - ✓ Ideally, do it after every lecture so you are prepared for next class.
 - ✓ If you occasionally do your homework late, you will get credit for it.
- ✓ **Clickers:**
 - ✓ Automatic 2 pts for each time you vote (right or wrong).
 - ✓ ***Don't vote in a class you aren't registered in!!!!***
 - ✓ If you are here, but unable to vote, message me in Zoom chat.
- ✓ **Optional:**
 - ✓ *Peer Assisted Learning (PAL)* – MW 12 noon is full.
 - ✓ *Commit to Study (C2S)* – Allows you to drop lowest exam.



Review clicker question (Covers material from last lecture)

Go to [LearningCatalytics.com](https://www.learningcatalytics.com) and login with your MasteringChemistry (Session ID = 82407234).

1) Which of the boxed terms (A-J) is correctly used in the following paragraph?

“When reacting with sulfur, the **compound** strontium will **gain** electrons to form

the **Sr¹⁺** **anion**. Sulfur, a typical **metal**, will gladly accept electrons from

strontium resulting in the formation of the **S²⁻** **cation**. At this point the two

ions **repel** each other to form the **molecular** compound **Sr₂S**.”

Review clicker question (Covers material from last lecture)

Go to [LearningCatalytics.com](https://www.learningcatalytics.com) and login with your MasteringChemistry (Session ID = 82407234).

2) How many protons, neutrons and electrons does $^{120}\text{Sn}^{4+}$ have?

A) 70 p^+ , 50 n^0 and 50 e^-

C) 50 p^+ , 70 n^0 and 54 e^-

B) 70 p^+ , 50 n^0 and 74 e^-

D) 50 p^+ , 70 n^0 and 46 e^-

Answer:

- **Protons** = the atomic number of Sn on the periodic table = 50 p^+
- **Neutrons** = mass # - atomic # = $120 - 50 = 70 \text{ n}^0$
- **Electrons** = # p^+ - charge = $50 - 4 = 46 \text{ e}^-$ (check answer: $50 \text{ p}^+ + 46 \text{ e}^- = 4+$ charge)

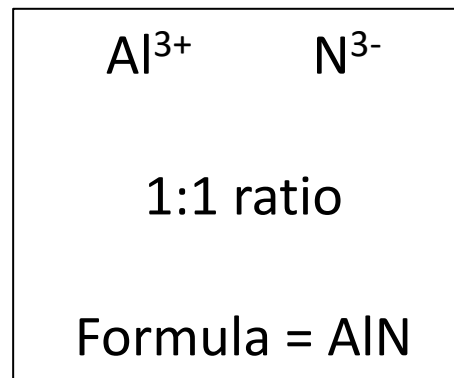
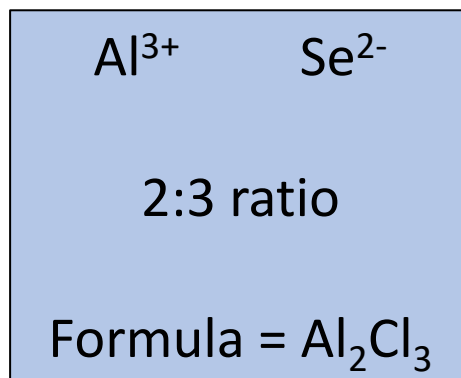
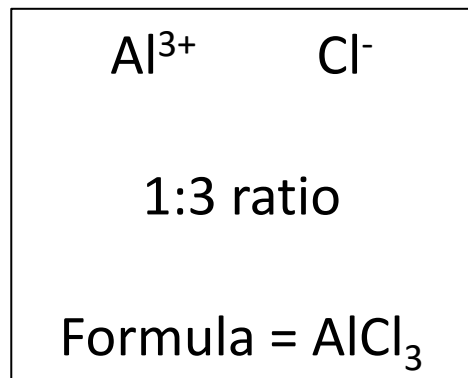
Review clicker question (Covers material from last lecture)

Go to [LearningCatalytics.com](https://www.learningcatalytics.com) and login with your MasteringChemistry (Session ID = 82407234).

3) Which of the following formulas is an unlikely compound for aluminum to form based on expected ion charges?



Answer: The following charges are based on the position of the elements on the periodic table.



CHEM 4 lecture

Friday – September 18, 2020

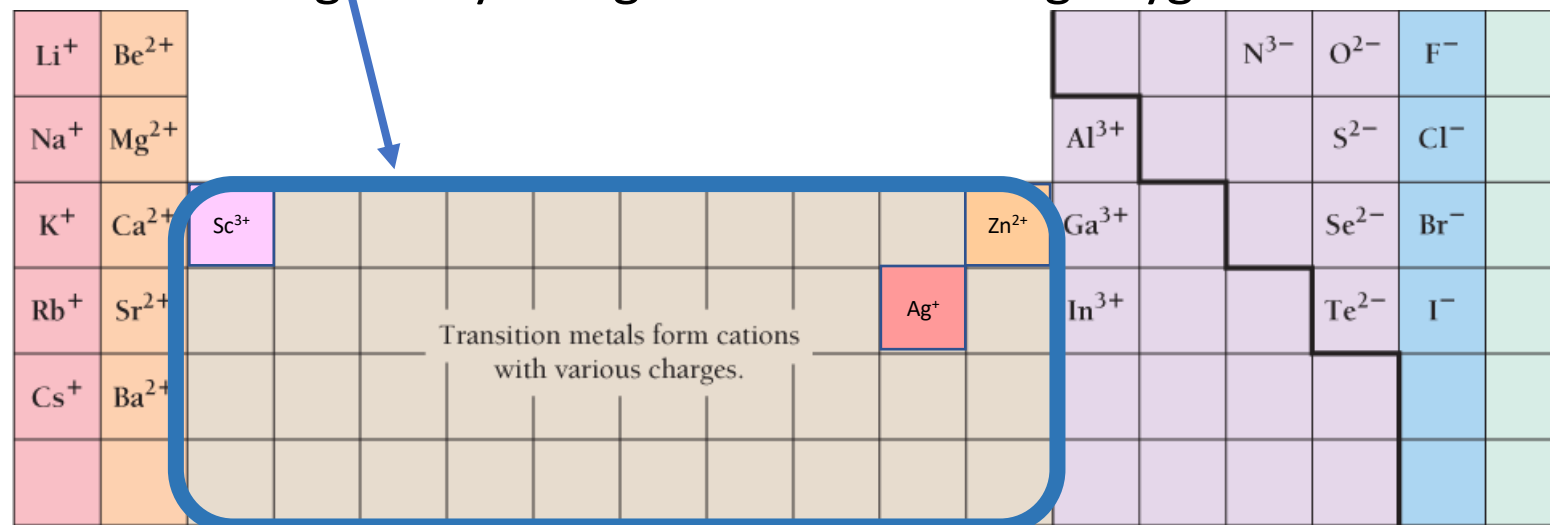
Sec 5.6 - 5.7

Naming Ionic Compounds

Reading clicker question (covers material from today's assigned reading)

Go to [LearningCatalytics.com](https://www.learningcatalytics.com) and login with your MasteringChemistry (Session ID = 82407234).

- 4) Which of the following statements is false? [Note: Type I metals always have the same charge; Type II metals can have more than one possible charge.]
- A) Polyatomic ions are groups of atoms with an overall net charge.
 - B) Most alkaline earth metals are Type I metals.
 - C) When naming ionic compounds, the name of the cation always comes first.
 - D) When naming a Type II ionic compound, roman numerals are used to identify the charge on the metal.
 - E) Most transition metals are Type I metals.
 - F) Oxyanions are negatively charged ions containing oxygen.



Li ⁺	Be ²⁺													N ³⁻	O ²⁻	F ⁻		
Na ⁺	Mg ²⁺													Al ³⁺		S ²⁻	Cl ⁻	
K ⁺	Ca ²⁺	Sc ³⁺												Ga ³⁺		Se ²⁻	Br ⁻	
Rb ⁺	Sr ²⁺													In ³⁺		Te ²⁻	I ⁻	
Cs ⁺	Ba ²⁺																	

Transition metals form cations with various charges.

Application: Household products and foods

Good Source of Fiber • 0g Trans Fat • No Preservatives

Ready To Serve • Do Not Add Water

Stove-Top: Heat in 1-quart saucepan, stirring occasionally, until hot.

Microwave: Heat in covered microwavable bowl on **High 2-4 minutes**, stirring once, until hot. **Careful** – leave in microwave 1 minute; stir.

Refrigerate leftovers. *Better if used by date on end of can*

Nutrition Facts

Serving Size 1 cup (253g)
Servings Per Container about 2

Amount Per Serving

Calories 110 Calories from Fat 15

% Daily Value*

Total Fat 1.5g **3%**

Saturated Fat 0g **0%**

Trans Fat 0g

Polyunsaturated Fat 0.5g

Monounsaturated Fat 1g

Cholesterol 0mg **0%**

Sodium 860mg **36%**

Total Carbohydrate 22g **7%**

Dietary Fiber 5g **18%**

Sugars 4g

Protein 6g

Vitamin A 10% • Vitamin C 0%

Calcium 2% • Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet.

Ingredients: Water, Tomatoes*, Carrots*, Tomato Paste*, Celery*, Potatoes*, Green Beans*, Dried Light Red Kidney Beans*, Penne Rigate Pasta (semolina wheat, egg white)*, Peas*. **Contains Less Than 1% of:** Spinach*, Corn Starch*, Sea Salt, Garbanzo Beans*, Sunflower Oil*, Onion Powder*, Raw Sugar*, Garlic Powder*, Parsley Flakes*, Fennel Seed powder*, Citric Acid, Black Pepper, Calcium Chloride, Thyme*, Basil Extract, Oregano Extract*, Natural Bay Leaf Flavor*, Caramel Color*. *Organic

CONTAINS WHEAT AND EGG INGREDIENTS.

DIST. BY **SMALL PLANET FOODS, INC.**, SEDRO-WOOLLEY, WA 98284 USA

CERTIFIED ORGANIC

THIS PRODUCT IS CERTIFIED ORGANIC BY THE WASHINGTON STATE DEPARTMENT OF AGRICULTURE IN ACCORDANCE WITH THE ORGANIC STANDARDS OF THE U.S. DEPARTMENT OF AGRICULTURE.



SERVING SUGGESTION

classic minestrone

Vegetarian | No MSG

soup

NET WT.
14.4 OZ
(408g)



Application: Household products and foods

Laundry detergent

Ingredients: Aqua (water), sodium lauryl sulfate, coceth-7 and glycerin (plant-derived cleaning agents), sodium citrate (water softener), oleic acid (plant-derived anti-foaming agent), sodium hydroxide (alkalinity builder), sodium chloride (thickener), boric acid and calcium chloride (enzyme stabilizers), protease and amylase (enzyme soil removers), methylisothiazolinone and benzisothiazolinone (preservative). Trace materials from other cleaning product ingredients. **No phosphates.**

Phosphates remain in wastewater and eventually make their way to a natural body of water. While phosphates are low toxicity, they instead cause nutrient pollution and feed the algae. This leads to eutrophication and harmful algal bloom.

Baking soda

	% Daily Value
Total Fat 0g	0%
Sodium 150mg	6%
Total Carbohydrate 0g	0%
Protein 0g	0%

Percent Daily Values are based on a diet of other people's misdeeds.

**Amount in 1/2 tsp (2.5g)

INGREDIENTS: Sodium Bicarbonate

Toothpaste

INGREDIENTS: Aqua, Hydrated Silica, Sorbitol, Potassium Nitrate, Glycerin, PEG-6, Sodium Lauryl Sulphate, Aroma, Titanium Dioxide, Xanthan Gum, Cocamidopropyl Betaine, Sodium Saccharin, Sodium Fluoride, Sodium Hydroxide. Do not use if you are allergic to any of the ingredients.

Shampoo

inactive ingredients Water, sodium laureth sulfate, sodium lauryl sulfate, cocamide ME-1, zinc carbonate, glycol distearate, dimethicone, fragrance, cetyl alcohol, guar hydroxypropyltrimonium chloride, magnesium sulfate, sodium benzoate, magnesium carbonate hydroxide, ammonium laureth sulfate, benzyl alcohol, sodium chloride, methylchloroisothiazolinone, methylisothiazolinone, sodium xylenesulfonate, blue 1, red 4.

Background: Naming ionic compounds

Naming Type I, Binary ionic compounds

- Binary = only 2 elements
- Ionic = metal and non-metal
- Type I = metal always has the same charge (labeled on periodic table below)

	1A	2A	Transition metals form cations with various charges.										3A	4A	5A	6A	7A	
	Li ⁺	Be ²⁺													N ³⁻	O ²⁻	F ⁻	
	Na ⁺	Mg ²⁺												Al ³⁺		S ²⁻	Cl ⁻	
	K ⁺	Ca ²⁺	Sc ³⁺									Zn ²⁺	Ga ³⁺		Se ²⁻	Br ⁻		
	Rb ⁺	Sr ²⁺										Ag ⁺	In ³⁺		Te ²⁻	I ⁻		
	Cs ⁺	Ba ²⁺																

Background: Naming Type I, Binary ionic compounds

Name → Formula

- Write down each ion.
- Combine ions in a ratio that cancels their charges.
- **Examples:**

Name	Ions	Ratio	Formula
calcium chloride	Ca^{2+} Cl^{-}	1:2	CaCl_2
aluminum oxide	Al^{3+} O^{2-}	2:3	Al_2O_3
silver fluoride	Ag^{+} F^{-}	1:1	AgF

Background: Naming Type I, Binary ionic compounds

Formula → Name

- Name each ion.
- Change the ending of the non-metal to “-ide”.

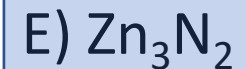
- **Examples:**

Formula	Name
FrBr	francium bromide
MgS	magnesium sulfide
BeCl ₂	beryllium chloride

Progress clicker question (covers material we are learning now)

Go to [LearningCatalytics.com](https://www.learningcatalytics.com) and login with your MasteringChemistry (Session ID = 82407234).

5) What is the formula for zinc nitride?



Answer: The following charges are based on the position of the elements on the periodic table.

zinc ion	nitride ion
Zn ²⁺	N ³⁻

cancel in a 3:2 ratio

Formula = Zn₃N₂

Background: Naming ionic compounds

Naming Type II, Binary ionic compounds

- Binary ionic = only 2 elements (metal and non-metal).
- Type II = metal can have varying charge (all the metals that are NOT labeled on periodic table below).
- Uses roman numerals to indicate the charge on the metal.

	2A										3A	4A	5A	6A	7A	
	Li ⁺	Be ²⁺											N ³⁻	O ²⁻	F ⁻	
	Na ⁺	Mg ²⁺									Al ³⁺			S ²⁻	Cl ⁻	
	K ⁺	Ca ²⁺	Sc ³⁺							Zn ²⁺	Ga ³⁺			Se ²⁻	Br ⁻	
	Rb ⁺	Sr ²⁺								Ag ⁺	In ³⁺			Te ²⁻	I ⁻	
	Cs ⁺	Ba ²⁺														

Transition metals form cations with various charges.

Background: Naming Type II, Binary ionic compounds

Name → Formula

- Write down each ion. The roman numeral indicates the charge on the metal.
- Combine ions in a ratio that cancels their charges.
- **Examples:**

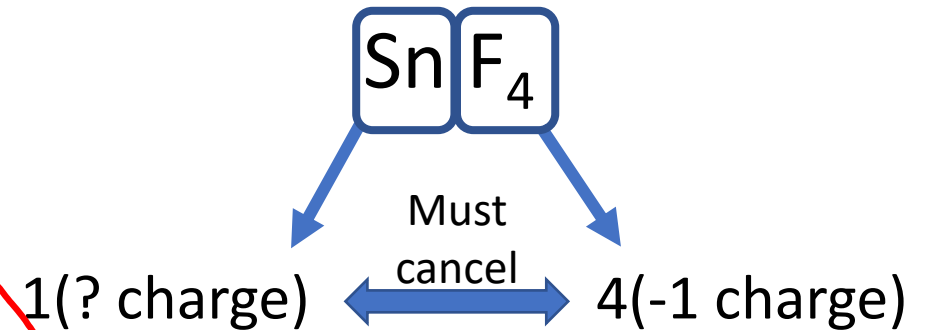
Name	Ions	Ratio	Formula
copper (I) oxide	Cu^+ O^{2-}	2:1	Cu_2O
tin (II) fluoride	Sn^{2+} F^-	1:2	SnF_2
lead (II) oxide	Pb^{2+} O^{2-}	1:1	PbO
lead (IV) oxide	Pb^{4+} O^{2-}	1:2	PbO_2

Background: Naming Type II, Binary ionic compounds

Formula → Name

- Name each ion.
- Change the ending of the non-metal to “-ide”.
- Use the expected charge on the non-metal to determine the charge (and roman numeral) for the metal.
- **Examples:**

Formula	Name
SnF_4	<i>tin(IV) fluoride</i>
CrBr_2	chromium (II) bromide
CrBr_3	chromium (III) bromide
Co_3N_2	cobalt (II) nitride



The 1 Sn must be +4 to cancel the 4 F⁻.
The +4 determines the roman numeral.