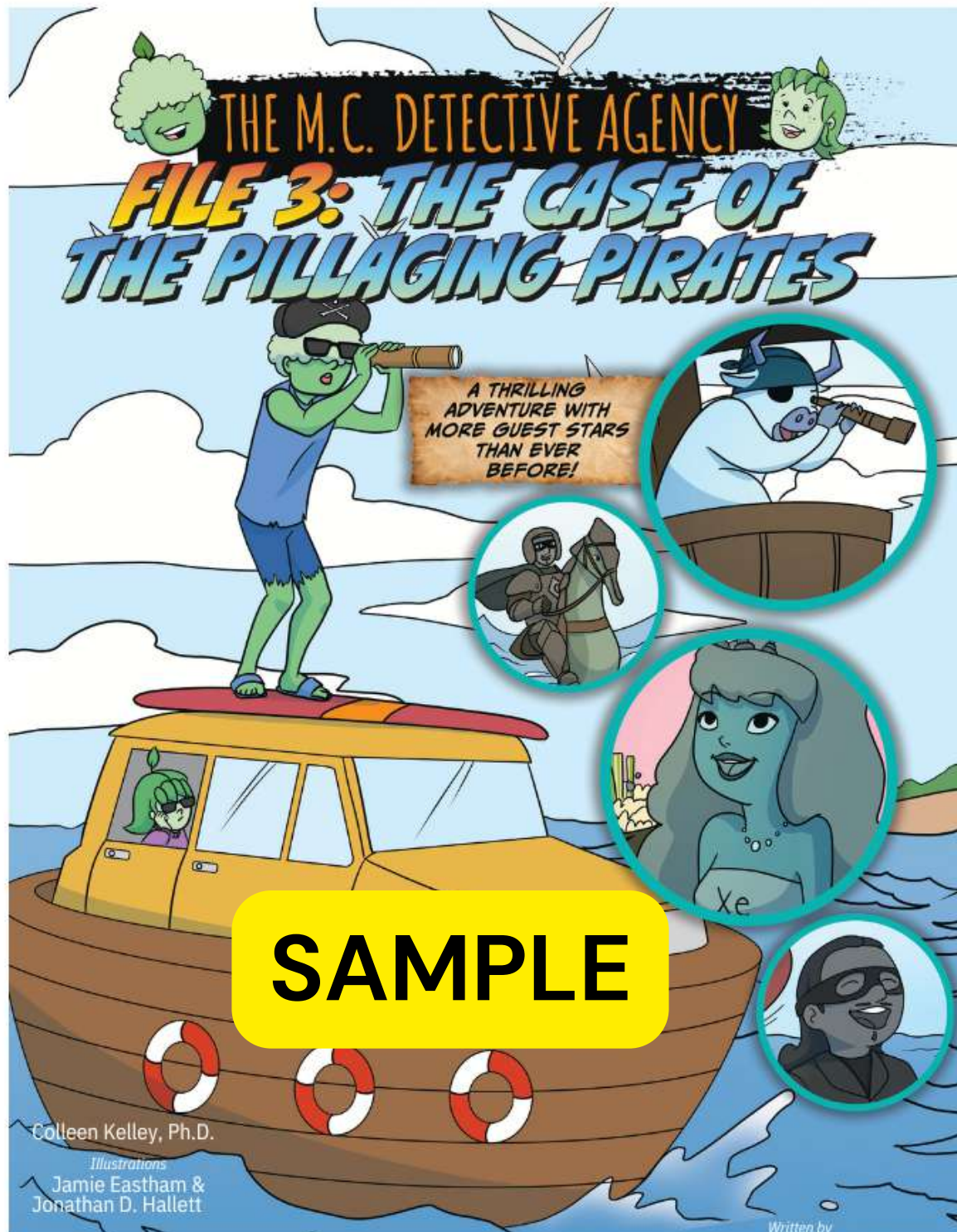


# Beginner Lesson Plans

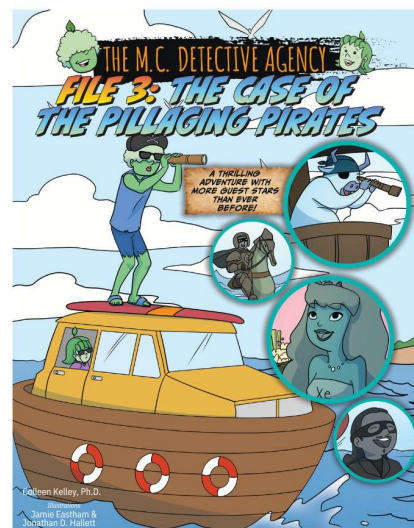
## Grades 3 - 5



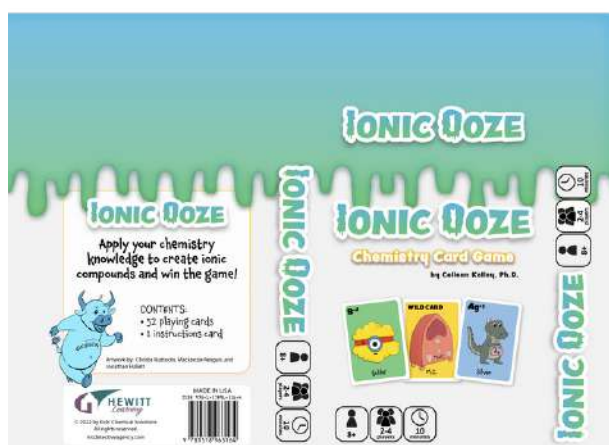
9 40-minute lessons



## Beginner Lesson Plans



- Print 3 copies of the Kids' Chemical Solutions Periodic Table of Elements (next page) for each student. OR Print and laminate 1 copy of the Kids' Chemical Solutions Periodic Table of Elements to be shared and re-used with pairs of students.
- Print 2 copies of the Kids' Chemical Solutions Periodic Table of Elements that shows the common charges for ions for each student. OR Print and laminate 1 of these to be shared and re-used with pairs of students.
- Each student will need a notebook and a pencil/eraser (not included in the kit).
- You will need a few decks of the Ionic Ooze card game available at the Hewitt Learning website under Kids' Chemical Solutions. You will need one deck of cards for every group of 4 students.
  - OR You can print and cut out the cards provided in the Kids' Chemical Solutions Activity Packet for File 3.



# Periodic Table of the Elements



Atomic Number — 6  
 Symbol — C  
 Name — Carbon  
 Average Atomic Mass — 12.01

Metals  
 Nonmetals  
 Metalloids

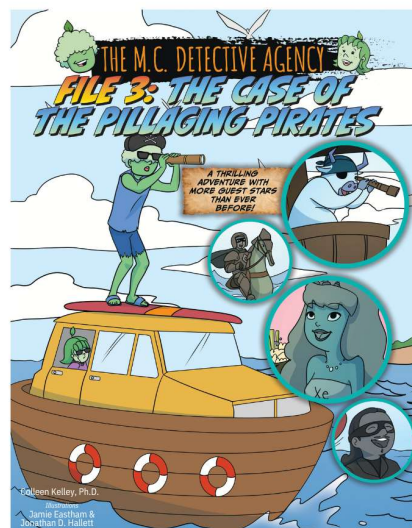
1	2	3	4	5	6	7	8
1 H Hydrogen 1.01	2 He Helium 4.00	3 Li Lithium 6.94	4 Be Beryllium 9.01	5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 16.00
9 F Fluorine 19.00	10 Ne Neon 20.18	11 Na Sodium 22.99	12 Mg Magnesium 24.31	13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07
17 Cl Chlorine 35.45	18 Ar Argon 39.95	19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.87	23 V Vanadium 50.94	24 Cr Chromium 52.00
25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.38	31 Ga Gallium 69.72	32 Ge Germanium 72.63
33 As Arsenic 74.92	34 Se Selenium 78.97	35 Br Bromine 79.90	36 Kr Krypton 83.80	37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22
41 Nb Niobium 92.91	42 Mo Molybdenum 95.95	43 Tc Technetium 97.00	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41
49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29	55 Ba Barium 137.33	56 La Lanthanum 138.91
57 Fr Francium 223.02	58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium 144.91	62 Sm Samarium 150.40	63 Eu Europium 151.96	64 Gd Gadolinium 157.25
65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.05	71 Lu Lutetium 174.97	72 Hf Hafnium 178.49
73 Ta Tantalum 180.95	74 W Tungsten 183.84	75 Re Rhenium 186.21	76 Os Osmium 190.20	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59
81 Tl Thallium 204.38	82 Pb Lead 207.00	83 Bi Bismuth 208.98	84 Po Polonium 209	85 At Astatine 209	86 Rn Radon 222.02	87 Fr Francium 223.02	88 Ra Radium 226.03
89-102 **	89 Ac Actinium 227.03	90 Th Thorium 232.04	91 Pa Protactinium 232.04	92 U Uranium 238.03	93 Np Neptunium 237.05	94 Pu Plutonium 244.06	95 Am Americium 243.06
96 Cm Curium 247.07	97 Bk Berkelium 247.07	98 Cf Californium 251.08	99 Es Einsteinium 252.08	100 Fm Fermium 257.10	101 Md Mendelevium 258.10	102 No Nobelium 259.10	103 Lr Lawrencium 260
104 Rf Rutherfordium 261	105 Db Dubnium 268.13	106 Sg Seaborgium 269.13	107 Bh Bohrium 270.13	108 Hs Hassium 289.13	109 Mt Meitnerium 277.15	110 Ds Darmstadtium 282.16	111 Rg Roentgenium 282.17
112 Cn Copernicium 286.18	113 Nh Nihonium 286.18	114 Fl Flerovium 290.19	115 Mc Moscovium 290.20	116 Lv Livermorium 293	117 Ts Tennessine 294	118 Og Oganesson 295.22	119 Uue Ununennium 296





# FILE 3 OVERVIEW

## Beginner Lesson Plans



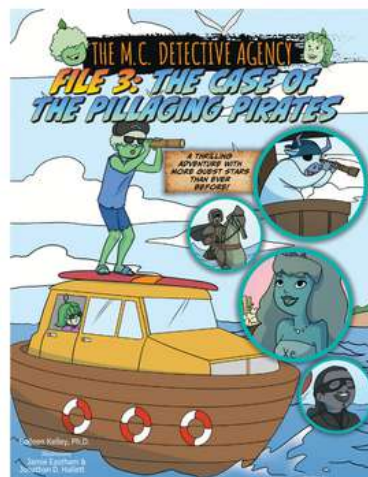
### Overview:

Students will now be moving from individual atoms to putting them together to make ionic compounds. This is a thoughtful process and students (and teachers!) should take their time in figuring out the formula and name for each compound. If students use "Zero is Our Hero" every time they assemble an ionic compound to determine a formula, they will have ease and clarity (and accuracy!). There are no shortcuts and the assembly of formulas should be methodical each time. Confidence can be built by following the processes outlined in these lesson plan. Allow students to dive into this process and swim around in confusion for a bit...clarity will come as they work their way through each formulas.

This sequence of 9 lessons associated with File 3: The Case of the Pillaging Pirates are design to impart the skills of writing names and formulas for ionic compounds.



# Beginner Lesson Plans



## Description:

This lesson is focused on understanding that atoms can gain or lose electrons and when this happens, the atom becomes an ion with a charge. Students will understand the following terms: i

- atom
- ion
- cation
- anion

Students will also be able to predict how many electrons an atom gains or loses.

## Activity Outcomes:

- Students will be categorize atoms, cations, and anions.
- Students will be able to write the charge of an ion of an atom.
- Students will understand the common charges of ions.

### Materials Needed:

1. Each student will need a pencil, eraser, and a notebook.
2. Each student will need access to the Kids' Chemical Solutions Periodic Table of the Elements found on page 3.
3. Each student will need access to the Kids' Chemical Solutions Activity Packet File 3: The Case of the Pillaging Pirates.


### Setup for Activities 1 and 2:

- Each student will need a pencil, eraser, and a notebook.
- Each student will need access to the Kids' Chemical Solutions Periodic Table of the Elements found on page 3.
- Each student will need access to the Kids' Chemical Solutions Activity Packet File 3: The Case of the Pillaging Pirates.
- Students can work alone or in groups of 2 or 3.

### Activity 1 (15 minutes)

- Activity/Questions/Instructions
  - The teacher will write this on the white board:
    - Atoms have no charge.
    - Cations have a + charge.
    - Anions have a - charge.
  - The students will complete this Poppi's Puzzle. Students will write their answers in their notebooks OR in the Activity Packet.
- Conclusion/Wrap-up
  - When all groups are done have each group share their answers.
  - The Answer Keys to Poppi's Puzzles are in the Activity Packet.
  - Alternative: The teacher can make their own post-it notes like this puzzle to continue reinforcing these concepts.
    - Place the post-its on a white board and have students place them in "baskets" just like Poppi's Puzzle shown here.

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**POPPI'S PUZZLES**

Help Poppi to organize this mess of notes by writing the symbol (and charge if an anion or cation) in the baskets below. There are some already placed in the baskets.

The diagram shows three baskets labeled 'atoms', 'anions', and 'cations'. Above the baskets are several post-it notes with chemical symbols and charges: Li<sup>+1</sup>, P<sup>-3</sup>, Br<sup>-1</sup>, Rb<sup>+1</sup>, S<sup>-2</sup>, Ca<sup>+2</sup>, Ra, O<sup>-2</sup>, K<sup>+1</sup>, Cl<sup>-1</sup>, F, Mg, Al<sup>+3</sup>, and I. The basket labeled 'atoms' contains the letter 'P'. The basket labeled 'anions' contains 'N<sup>-3</sup>'. The basket labeled 'cations' contains 'Na<sup>+1</sup>'. The page number '25' is visible at the bottom.

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## Activity 2 (25 minutes)

- Activity/Questions/Instructions
  - The students will complete this Poppi's Puzzles. Students will write their answers in their notebooks OR in the Activity Packet.
- Conclusion/Wrap-up
  - When all groups are done with this Poppi's Puzzle, have them share their answers.
  - The Answer Keys to Poppi's Puzzles are in the Activity Packet.
  - Alternative: The teacher can their own table like the one shown below to continue reinforcing that a cation has a + charge and an anion has a - charge.
    - Remember to use the Kids' Chemical Solutions Periodic Table of Elements that shows common charges - page 4 of this lesson plan.
    - Group 1 is always +1.
    - Group 2 is always +2
    - Aluminum is the ONLY element in group 3 that you'll use. It is always +3.
    - Group 5 is always -3.
    - Group 6 is always -2.
    - Group 7 is always -1.



## POPPI'S PUZZLES

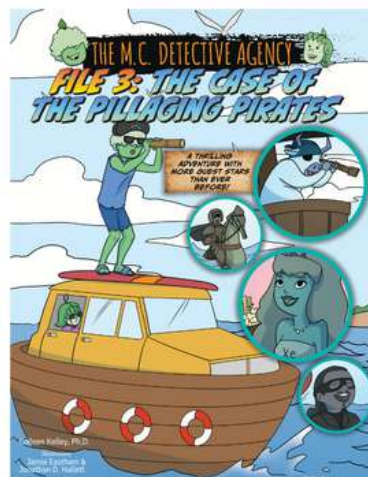
Help Poppi to complete the table below. Remember to have your Periodic Table - the accessorized one with the charge above each group - handy!

Name of the Atom	Ion Formed	Is it a cation or anion?
Chlorine	$Cl^{-1}$	anion
Rubidium		
Sulfur		
Aluminum		
Strontium		
Fluorine		
Phosphorous		
Nitrogen		
Oxygen		
Sodium		



LESSON  
**2**  
40 MINUTES

## Beginner Lesson Plans



### Description:

This lesson continues to focus on understanding that atoms can gain or lose electrons and when this happens, the atom becomes an ion with a charge. Students will understand the following terms:

- atom
- ion
- cation
- anion

Students will also be able to predict how many electrons an atom gains or loses.

### Activity Outcomes:

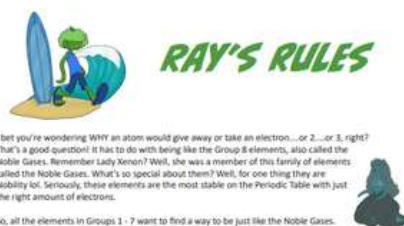
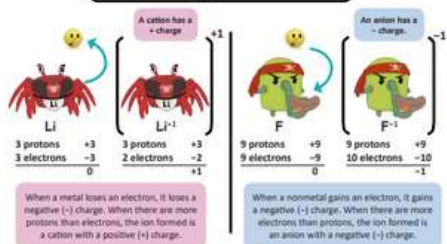
- Students will be able to categorize atoms, cations, and anions.
- Students will be able to write the charge of an ion of an atom.
- Students will understand the common charges of ions.

## Activity 1 (30 minutes)

- Activity/Questions/Instructions
  - The students will read these Ray's Rules and write 2 - 3 sentence summary in their notebooks.
  - The teacher can explain these Ray's Rules again.
  - The students will complete this Poppi's Puzzle. Students will write their answers in their notebooks OR in the Activity Packet.
- Conclusion/Wrap-up
  - When all groups are done with this Poppi's Puzzle, have them share their answers.
  - The Answer Keys to Poppi's Puzzles are in the Activity Packet.



**Ions: Cations and Anions**  
Ions are formed when an atom gains or loses an electron. Metals always lose electrons and nonmetals always gain electrons.



**Metals**

Pattern: Total electrons = \_\_\_ electrons + same number of electrons as nearest Noble Gas

Examples:
 

- Na has 11 electrons - 1 electron = 10 electrons which is the same as Ne
- Ca has 20 electrons - 2 electrons = 18 electrons which is the same as Ar

**Nonmetals**

Pattern: Group # + \_\_\_ electrons = 8

Examples:
 

- Group 5 + 3 electrons = 8
- Group 6 + 2 electrons = 8
- Group 7 + 1 electron = 8

Periodic Table with electron counts and charges for groups 1-7.

**POPPI'S PUZZLES**

**WHO AM I?**

I am a cation who loses 1 electron to have the same number of electrons as Ne.

I am an anion who gains 2 electrons to have the same number of electrons as Ar.

I am a cation who loses 2 electrons to have the same number of electrons as Ar.

I am an anion who gains 3 electrons to have the same number of electrons as Ar.

I am a cation who loses 1 electron to have zero electrons.

I am a cation who loses 3 electrons to have the same number of electrons as Ne.

I am a cation who loses 1 electron to have the same number of electrons as He.

I am an anion who gains 1 electron to have the same number of electrons as Ne.

## Activity 2 (10 minutes)

- Activity/Questions/Instructions
  - The students can cut out the character cards in the Activity Packet and play match up the charges of each card/ion/character with the Periodic Table shown on page 4.