CAEMISTRY

The central and most important branch of science



Fall 2020 schedule:

	Date	Торіс	NGSS (if applicable)	Page(s)						
Week 1	Tuesday, Sept 1	The story of the atom	5-PS1-1	1-2						
	Thursday, Sept 3	Elemental, dear Watson!		3-4						
	Friday, Sept 4	Hands-on Activity: Modelin	on Activity: Modeling Clay Orbitals							
Week 2	Tuesday, Sept 8	A noble quest		7-10						
	Thursday, Sept 10	Why share electrons?	5-PS1-3	11-12						
	Friday, Sept 11	Hands-on Activity: Edible E	Experiments	13-16						
Week 3	Tuesday, Sept 15	Element, mixture, compound		17-18						
	Thursday, Sept 17	What is radioactivity?		19-20						
	Friday, Sept 18	Gameshow review								
Week 4	Tuesday, Sept 22	Conservation of matter	5-PS1-2	21-22						
	Thursday, Sept 24 Physical reactions 5-PS1-4									
	Friday, Sept 25	Hands-on Activity: Time to	Fizz	25-26						
Week 5	Tuesday, Sept 29	Chemical reactions part 1	5-PS1-4	27-29						
	Thursday, Oct 1	5-PS1-4	30							
	Friday, Oct 2	Hands-on Activity: Lemon	or Vinegar Battery	31-32						
Week 6	Tuesday, Oct 6	How does a toaster work?	4-PS3-2, 4-PS3-4	33-34						
	Thursday, Oct 8	The building block of life	4-PS4-3	35-36						
	Friday, Oct 9	Gameshow review								
Week 7	Tuesday, Oct 13	Where does fuel come from?	4-ESS1-1, 4-ESS3-1	37-39						
	Thursday, Oct 15	What is fire <i>really</i> ?		40						
	Friday, Oct 16	Hands-on Activity: Build a	Levee 4-ESS3-2	41-42						
Week 8	Tuesday, Oct 20	The chemistry of lava		43						
	Thursday, Oct 22	Acids and bases		44						
	Friday, Oct 23	Gameshow review								
Week 9	Tuesday, Oct 27	Why do we chlorinate pools?		45						
	Thursday, Oct 29	Photosynthesis	5-PS3-1, 5-LS1-1	46						
	Friday, October 30	Hands-on Activity: Franker	iseeds	47-48						
Week 10	Tuesday, Nov 3	All about the sugars		49						
	Thursday, Nov 5	Why can't you eat books?		50-51						
	Friday, Nov 6	Gameshow review								

The gameshow reviews are interactive and best when attended live (10:00-10:45 a.m. Pacific / 1:00-1:45 p.m. Eastern time). If you can't attend live, it is recorded and you can watch the replay afterward. The questions used during the gameshow will also be emailed to all participants and can be used as a traditional assessment.

Have questions? Contact jenny@science.mom

	Date	Торіс	NGSS (if applicable)	Page(s)
Week 11	Tuesday, Nov 10	Lipids!	,	52
	Thursday, Nov 12	Chemistry in real life: amazing	g plankton	53
	Friday, Nov 13	Hands-on Activity: Plant Pro	opagation	54-55
Week 12	Tuesday, Nov 17	How things glow in the dark		56
	Thursday, Nov 19	From cells to colonies	4-LS1-1	57
	Friday, Nov 20	Gameshow review		
Week 13	Tuesday, Nov 24			
	Thursday, Nov 26	Thanksgiving break - No class		
	Friday, Nov 27			
Week 14	Tuesday, Dec 1	The nitrogen cycle	5-LS2-1	58
	Thursday, Dec 3	Chemistry in real life: water re	eclamation	59
	Friday, Dec 4	DIY Water Filter		60
Week 15	Tuesday, Dec 8	Fireworks and lab safety		61
	Thursday, Dec 10	Gameshow review		
	Friday, Dec 11	Gameshow review		

You will see boxes like this through out the notes. Use them to draw your favorite moment from class, to write down something cool you learned, or for plain oldfashioned doodling. If you'd like to share your doodle work with Science Mom and Math Dad, take a picture and then tag us on social media, or email it to art@science.mom

Your doodfe 2673e

Supply List for Friday Hands-on Activities:

September 4 - Modeling Clay Orbitals

- Toothpicks
- Modeling clay or play dough (7 different colors)

September 18 - Edible Experiments

- Granulated Sugar (at least 7 cups)
- Kool-aid packets
- Cake pop sticks or string
- A ruler
- 2 pint-size mason jars with lids OR cups and rubber bands
- Coffee filters or paper
- 2 Microwavable popcorn packets

September 25 - Time to Fizz!

- 6 Alka-Seltzer tablets
- 6 bottles of soda in plastic containers with narrow tops. Any size and type will work, but I recommend 16 oz coke bottles (because Coke is slightly more carbonated than other sodas). Be sure to save the bottles when finished because they will be used twice in this experiment and again in the December 4th water filtration experiment.
- Baking soda
- 3 packages of Pop Rocks candy
- 6 Balloons (standard 9 inch size)
- A funnel (to help get baking sodá inside the balloon)
- Food Coloring
- Vinegar
- Vegetable oil (a whole bottle)

October 2 - Lemon or Vinegar Batteries

- Citrus fruit such as lemons OR a potato OR vinegar and an empty ice cube tray
- An LED diode
- Copper penny, wire, or copper sheets
- Galvanized nail or zinc sheets
- Alligator clips
- Scissors or knife

October 16 - Build a Levee

- A rectangular Tupperware container (or a glass pan)
- Duct tape
- A plastic bag
- Fine-grained building materials (1 cup flour mixed with 1 Tbsp cocoa powder)
- Course grained building materials (beans, nuts, or dried fruit)
- Water
- (Optional) legos or other small items to represent the town

October 30 Frankenseeds

- Cardboard egg carton(s)
- Paper towels
- An empty bread or produce bag

• At least 6 types of seeds from the kitchen (could include rice, beans, lentils, chia seeds, walnuts, sunflower seeds, almonds, peanuts, flax seeds quinoa, or seeds from inside foods like apples, peas, avocados, pears, oranges, kiwis, or cucumbers)

November 13 - Plant Propagation

- One root vegetable (such as a carrot, beet, turnip, radish, or rutabaga)
- One tuber (sweet potato, potato, ginger, or turmeric)
- A pineapple
- 3 cups (drinking cups will work fine)
- Toothpicks

December 4 - DIY Water Filter

- Two plastic 12 or 16 oz bottles (can reuse the ones from Sept 25)
- Scissors (some adult supervision may be needed when cutting the bottles)
- Sand
- Gravel
- Activated charcoal
- Coffee filters
- A small square of cotton fabric or a couple of cotton balls

The story of the ATOM

$^\prime$ WHAT ARE THINGS REALLY MADE OF? $_{/}$







FILL IN THE BLANKS USING THESE WORDS:



3



ARRANGING ALL OF THE ELEMENTS BY NUMBER CREATES A REALLY WIDE TABLE. SO THIS BLOCK (THE LANTHANIDES AND ACTINIDES) IS USUALLY SHOWN BELOW THE REST OF THE ELEMENTS.

Hands-on Activity

MODELING CLAY ORBITALS!



INSTRUCTIONS:

Shape the colors of clay that represent neutrons and protons into small spheres and put them together to make the nucleus. Then cover the nucleus in layers of clay to represent the orbitals. Use the images below to guide you in making models of a hydrogen, helium, lithium, carbon, fluorine, and neon atom. Partially-filled orbitals can be represented by moulding half of the orbital. Use toothpicks to attach the p-orbitals.



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A FULL SHELL OF ELECTRONS IS LIKE A HAPPY TURTLE - UNLESS IT GETS TOO BIG.



An ______ with a full shell is stable. It is not interested in reacting with other elements. But if it gets too large, then that "turtle" is no longer very happy, even though it has a full shell.





 $\left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \end{array} \right)$



The elements in this family are called the "halogens." At room temperature, the first three (fluorine and chlorine) are gasses with strong unpleasant smells. Breathing too much of them is toxic and they are all flammable and corrosive (will destroy or damage other substances). Can you draw lines to match each element in this family with it's fact box?



S/Ablb





Electrons really like to be in pairs. Fluorine, which is crazy reactive, has nine electrons, leaving one of them unpaired. Neon - a noble gas - has ten electrons, each of them paired in Your notes: _____ different "shells" or orbitals around the nucleus. I NEED A BUDDY NOW! **@** 6 fluorine neon By themselves, chlorine and sodium are both "unhappy" because they have unpaired electrons. IONIC BOND: A CHEMICAL BOND WHERE AN ELECTRON IS TRANSFERRED FROM ONE ATOM TO ANOTHER. BOTH NEED THIS CREATES IONS WITH OPPOSITE CHARGES, ELECTRONS HERE TO BE HAPPY! AND OPPOSITES ATTRACT! 00 <u>م</u> VOUR DOODLE SPACE CHLORINE SODIUM Draw your favorite moment from class or write a cool fact! But if sodium gives it's lonely electron to chlorine, then they're both happy. They've formed an ionic bond! Other atoms solve the same problem by sharing electrons. ሪ N SODIUM CHLORIDE



COVALENT BOND: A CHEMICAL BOND WHERE ELECTRONS ARE SHARED BETWEEN TWO ATOMS. SOMETIMES THE ELECTRONS ARE SHARED EQUALLY, AND OTHER TIMES ONE ATOM (WE'RE TALKING ABOUT YOU, OXYGEN!) WILL BE A BIT GREEDY.

Your notes: _____



Choose four elements to study. Research them and draw cards for them on the blank templates on the next page (you can print more pages to make more if you'd like!) Be sure to look up the chemical symbol and atomic number of your element. Research how your element behaves at room temperature and give it a hazard rating too. Then draw an avatar (it can look like anything! Be creative and have fun designing your cards.



Image:	At room temp: Hazard rating: Other:
Image:	Image: Image

Hands-on Activity

EDIBLE EXPERIMENTS - ROCK CANDY!



EDIBLE EXPERIMENTS CONTINUED ...

The science behind the treat:

When sugar dissolves into water it forms a MIXTURE - the sugar is still there and the water is still there. New molecules have NOT been formed. But the sugar molecules are attracted to the water and visa versa. When the water is HOT, it can hold more sugar than when it is cool. If you add as much sugar as the water can "carry" when it's hot, then as it cools the sugar will "come out" of the water and you'll see crystals form. If the sugar crystals grow slowly, you end up with larger crystals. If the sugar crystals grow quickly, they're smaller.

YOUR DOODLE SPACE Draw your favorite moment from class or write a cool fact!

Troubleshooting tips:

What if there are no crystals on your stick? First, did you "seed" it by getting it wet and rolling it in dry sugar before-hand? This really helps! Second, sometimes the crystals take DAYS (up to 7 or 10) to form. If your first batch isn't working, you can try again and increase the amount of sugar (add an extra cup). The hardness of your water and measuring error can make a difference. If you don't see crystals after 14 days, probably best to try again with a fresh batch and add some extra sugar this time.

Do you think you could also make salt crystals using the same recipe? Why or why not?

How did your crystals turn out? Did you see a difference between the size and shape of the crystals in different jars? How long did it take before your rock candy started growing?

Element vs Mixture vs Compound





Each of the atoms below is going to gain or lose protons, neutrons, or electrons. Write down what the atom will be after that change!

]	1 H Hydroge	'n							2 He Helium		
	3 Li	4 Berylliu) m	5 B	⁶ C	7 N	⁸ O	9 F	¹⁰ Ne		
	Liuliun			13 AI	^{Carbon} 14 Si	15 P	16 S	17 CI	18 Ar		
				Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon		
2	8	29	30	31	32	33	34	35	36		
	Ni Nickel	Cu Copper	Zn ^{Zinc}	Gallium	Germanium	As Arsenic	Selenium	Br Bromine	Krypton		
4	6	47	48	49	50	51	52	53	54		
F	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	lodine	Xe Xenon		
7	8	79	80	81	82	83	84	85	86		
1	Pt Platinum	Au _{Gold}	Hg Mercury	TI Thallium	Pb Lead	Bismuth	Po Polonium	At Astatine	Rn Radon		





