UBC Geering Up
Engineering Outreach

Bath Bombs Activity

Subject: Science/ ADST	**Grade:** 10-11	**Duration:** 1 hour
Lesson Overview	Students create their own bath bomb and use this context to explore acid–base reactions, gas formation, and energy changes in chemical processes. As they mix and shape their bath bombs, they connect observable fizzing and bubbling to particle-level explanations and everyday applications of chemistry.	

Curriculum Ties (in addition to satisfying multiple core competencies):

Science 10 – Big Ideas & Content

- Energy change is required as atoms rearrange in chemical processes.
- Types of chemical reactions (e.g., acid–base, decomposition).

Chemistry 11 – Big Ideas & Content

- Matter and energy are conserved in chemical reactions.
- Acid–base reactions and their applications (household products, solutions).

Content Objectives

By the end of the activity, students will be able to:

- Describe how an acid (citric acid) and a base (baking soda) react in water to produce a gas (CO_2).
- Identify evidence of a chemical reaction (fizzing, bubbling, gas formation, new substances).
- Explain the role of different ingredients in a bath bomb (citric acid, baking soda, Epsom salts, cornstarch, oil, water, colour, fragrance).

- Relate the bath bomb reaction to concepts of energy change and conservation of matter in chemical processes.
- Predict how changing the ratios of ingredients or conditions (amount of water, temperature) might affect the reaction.

Materials & Equipment Needed

Consumables:	Non-Consumables:
• A Mold (per student) - optional, can also put in plastic bags! • Dropper • Measuring Spoons (per table or group) • Paper Bowls (per student) • Container • Sharpie	• 3 tbsp Baking Soda • 2 tbsp Epsom Salts • 1 tbsp Citric Acid • 2 tbsp Cornstarch • 2 tsp Baby Oil • 2-3 Drops of soap colorant • 1 tsp Water • Spoon • Gloves • Ziplock Bags • Black garbage bags for tables • Growing sea creatures • Dixie Cups/Plastic Cups • 2 drop essential oil (optional)

Lesson & Activity

Lesson Stages	**Learning Activities**
Introduction	• Start with a quick hook: “Who has used a bath bomb? What did you notice?” (colour, fizzing, bubbles, smell).

	• Demonstrate dropping a bath bomb (or a small piece) into warm water. Ask: What do you think is happening chemically? • Briefly connect to acid–base reactions and chemical change: a reaction between citric acid (acid) and baking soda (base) produces a gas (CO_2), which we see as fizzing. • Review basic safety: no tasting, avoid touching eyes, handle powders gently, wear gloves if available. • State the goal: "Today we'll make our own bath bombs and use them to investigate how chemical reactions work." **Discussion Points:** • Epsom Salts are made up of naturally occurring minerals found in water. It's Magnesium sulfate, they're called Epsom Salts after the town Epsom in England where the compound was first distilled from water. Epsom Salts are used to relieve stress, to help soothe jangled nerves • How do bath bombs work? When a bath bomb touches water, it reacts. It starts to bubble and fizz. There is a chemical reaction happening right then and there. It is an acid-base reaction, as an acid reacts with a base. • The citric acid is our acid in this reaction, and the baking soda is our base. The two react together and create a gas (bubbles or fizzing. • The citric acid is special, it binds with minerals (the Epsom salts) to soften the water. This makes the water feel nice and velvety. **FUN FACT**: Citric Acid can be found in soaps and laundry detergents. In small quantities it can remove excess minerals from the water.

Activity	
	1. Mix the dry ingredients • In a paper bowl, students add: 3 tbsp baking soda, 2 tbsp Epsom salts, 1 tbsp citric acid, 2 tbsp cornstarch. • Use a spoon to blend until the mixture looks even and smooth **2. Mix the wet ingredients** • In a small cup, students combine: 1 tsp water, 2 tsp baby oil, 2–3 drops of colour, and a few drops of essential oil (optional). • Stir with a popsicle stick or spoon. Explain that this will activate the reaction if added too fast. **3. Combine wet and dry – slowly** • While mixing the dry ingredients with their hands or a spoon, students slowly add the liquid mixture a few drops at a time. • If the mixture starts to fizz or foam, pause and mix quickly to stop the reaction – discuss that this is the acid–base reaction starting too early. • Continue until the mixture has the texture of slightly damp sand: it should clump when squeezed, but not feel wet or mushy. • If it still crumbles, prepare a small extra amount of oil–water mix and add very slowly. **** Important notes:** • If the mixture starts to foam, you are adding the liquid too fast. Quickly mix the reacting ingredients into the non reactive part and you should be able to stop the reaction. • When all of the wet ingredients have been added, you should have a mixture with the consistency of slightly damp sand. It should clump together when you squish it and not fall apart. If not, mix up some more water/oil solution and add until proper consistency. • It's important to note that the bath bombs should not be too

	liquidy, otherwise they will not set and continue to expand. **4. Molding the bath bomb** • Place part of the mixture into a mold (or into half a plastic egg / small cup). • If using a growing capsule or small toy, place it in the centre and cover with more mixture. • Press firmly to pack it tightly—explain that this affects how it holds together and fizzes later. • Leave the bath bombs in molds to dry; if possible, refrigerate or leave in a cool, dry place for several hours or overnight.

Closure	• Have students label their Ziplock bags with their names and ingredients.
	• Whole-class debrief:
	  ○ What ingredients acted as the acid and base?
	  ○ What evidence do we have that a gas was produced?
	  ○ Where did the Epsom salts and cornstarch fit into the product (texture, feel, water-softening)?
	• When ready to use, just drop it into a warm bath, and relax. The bath bombs can be stored for up to six months.

Step Ups & Step Downs	**Step Downs** • Provide a pre-measured kit for each student (labelled cups/bags of each ingredient). • Focus discussion on observable changes (fizzing, bubbles, smell, texture) rather than chemical equations. • Give a guided worksheet with sentence starters such as: “I know a chemical reaction happened because…”. • Do the liquid mixing as a demo and have students only press and mold the bath bomb, if time or classroom management is a concern.

	Step Ups • Challenge them to research and compare homemade vs. commercial bath bombs (ingredients, safety, environmental impact). • Turn the extension into a mini lab report or poster where they present their "perfect bath bomb" recipe and justification. • Ask students to write and balance the chemical equation for the main reaction (baking soda + citric acid → salt(s) + CO_2 + water). • Try making different recipes for bathbombs and testing them in water! https://www.youtube.com/watch?v=TEqcpMx-6C0&t=139s

Background Knowledge

Epsom salts are magnesium sulfate, a naturally occurring mineral often used in baths to relax muscles and soften water.

Bath bombs typically rely on an acid–base reaction between citric acid (acid) and baking soda (base). When water is added, they react to produce carbon dioxide gas, which causes fizzing and bubbling.

Citric acid can also chelate or bind minerals (like those in Epsom salts), helping to soften water and change how it feels on the skin.

The reaction and product formation provide an accessible context to talk about:

- Conservation of matter (atoms rearranging, but not disappearing).
- Evidence of chemical change (gas production, new substances, irreversible changes).
- Everyday applications of acid–base chemistry (cleaners, detergents, personal care products).

Additional Resources

Tutorials:

- https://youtu.be/7vjogM0iDpU
- https://youtu.be/H1ike7_n4R0
- https://youtu.be/Ar78O1hl7TE
- https://youtu.be/UT1qWPeY5mA