REACTION
TIME

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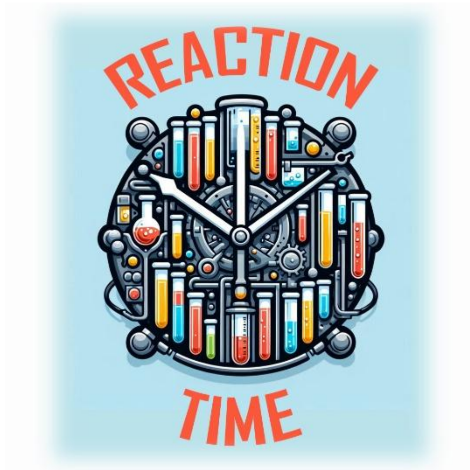
Na_2CO_3 STOICH DECKS	KOH STOICH DECKS	Na_2O STOICH DECKS
K_3PO_4 STOICH DECKS	Na_2S STOICH DECKS	$Mg(NO_3)_2$ STOICH DECKS
$Al(C_2H_3O_2)_3$ STOICH DECKS	$Pb(ClO_3)_2$ STOICH DECKS	$CuCl_2$ STOICH DECKS

$FeBr_3$	ZnI_2	Na_2SO_4
$Ca(NO_3)_2$	$AgC_2H_3O_2$	Na
K	Mg	Al

Pb	Ag	Cu
Fe	Zn	Ca
HNO_3	HCl	H_2SO_4



The Game

27 printable cards with elements and compounds

2-6 players

10-15 minutes

Need spoons or some other safe object (I like to use rubber stoppers)

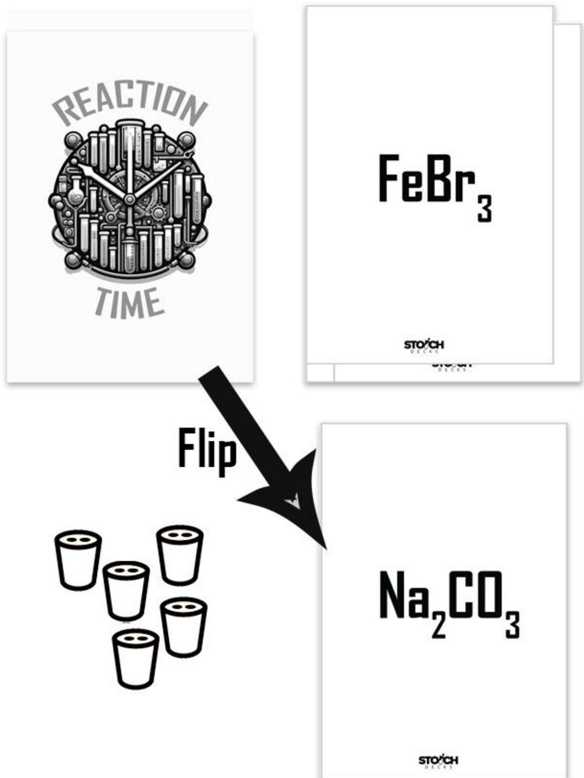
Score sheet

Goal: Earn the most points by grabbing the limited number of stoppers when a reaction occurs. Only the fastest students will be rewarded with points.

Setup

Print off the 27 cards (three pages of 9 each). You can print the backs of the cards as well. Use card stock so the game is reusable next year. Gather enough rubber stoppers for each group. Each group needs enough stoppers for the total number of players minus 1. Therefore, if six students are in a group, only five stoppers are needed.

Shuffle the cards and place them in the middle. Turn over one card to start.



How to Play

This game plays like the classic card game "Spoons" as they are trying to earn points by grabbing limited objects. One player will turn over the second card quickly. If a reaction occurs between the two cards that are face up (either single or double displacement), then students race to grab a stopper. Everyone who correctly predicts if a reaction will occur and grabs a stopper will receive a point.

If a student incorrectly grabs a stopper they will lose two points.

Students should be encouraged to use solubility rules to determine if a double displacement reaction occurs by forming an insoluble product. They should also use an activity series of metals to determine if a single displacement reaction will occur.

These are downloadable at www.stoichdecks.com under resources as well as being at the end of this document.

Once a round is scored, everyone puts their stoppers back in the middle and the card flipped over in the previous round becomes the top card in the discard stack. Another card is quickly turned over, and the next round starts.

The teacher can set the number of points needed to win according to the amount of time the class has available. 7 points is a nice quick game.

Solubility Rules

1. All alkali metal (lithium, sodium, potassium, rubidium, and cesium) and ammonium compounds are **soluble (aq)**.

2. All acetate, perchlorate, chlorate, and nitrate compounds are **soluble (aq)**.

3. Silver, lead and mercury (I) compounds are **insoluble (s)**.

4. Chlorides, bromides and iodides are **soluble (aq)**.

5. Carbonates, hydroxides, oxides, phosphates, silicates, and sulfides are **insoluble (s)**.

6. Sulfates are **soluble (aq)** except for calcium and barium which are insoluble.

You must use these rules in order. The first rule that applies to the compound in question is the most pertinent. For example, silver nitrate is soluble. Both nitrate (rule 2) and silver (rule 3) apply, but since the nitrate rule is first, it is what gets expressed. $AgNO_3$(aq). Silver chloride is solid. Since the silver rule (rule 3) comes before the chloride rule (rule 4) it is applied. AgCl (s).

Activity Series of Metals

Metal	Oxidation Reaction
Lithium	$Li(s) \longrightarrow Li^{+}(aq) + e^{-}$
Potassium	$K(s) \longrightarrow K^{+}(aq) + e^{-}$
Barium	$Ba(s) \longrightarrow Ba^{2+}(aq) + 2e^{-}$
Calcium	$Ca(s) \longrightarrow Ca^{2+}(aq) + 2e^{-}$
Sodium	$Na(s) \longrightarrow Na^{+}(aq) + e^{-}$
Magnesium	$Mg(s) \longrightarrow Mg^{2+}(aq) + 2e^{-}$
Aluminum	$Al(s) \longrightarrow Al^{3+}(aq) + 3e^{-}$
Manganese	$Mn(s) \longrightarrow Mn^{2+}(aq) + 2e^{-}$
Zinc	$Zn(s) \longrightarrow Zn^{2+}(aq) + 2e^{-}$
Chromium	$Cr(s) \longrightarrow Cr^{3+}(aq) + 3e^{-}$
Iron	$Fe(s) \longrightarrow Fe^{2+}(aq) + 2e^{-}$
Cobalt	$Co(s) \longrightarrow Co^{2+}(aq) + 2e^{-}$
Nickel	$Ni(s) \longrightarrow Ni^{2+}(aq) + 2e^{-}$
Tin	$Sn(s) \longrightarrow Sn^{2+}(aq) + 2e^{-}$
Lead	$Pb(s) \longrightarrow Pb^{2+}(aq) + 2e^{-}$
Hydrogen	$H_2(g) \longrightarrow 2\,H^{+}(aq) + 2e^{-}$
Copper	$Cu(s) \longrightarrow Cu^{2+}(aq) + 2e^{-}$
Silver	$Ag(s) \longrightarrow Ag^{+}(aq) + e^{-}$
Mercury	$Hg(l) \longrightarrow Hg^{2+}(aq) + 2e^{-}$
Platinum	$Pt(s) \longrightarrow Pt^{2+}(aq) + 2e^{-}$
Gold	$Au(s) \longrightarrow Au^{3+}(aq) + 3e^{-}$

Most likely to lose electrons

Least likely to lose electrons