Analyzing the Effectiveness of Various Types of Aspirin

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1 Price

Cost per gram:

- Baby Aspirin: $\frac{\$2.99}{1\ pack} \cdot \frac{1\ pack}{36\ tablets} \cdot \frac{1\ tablet}{81\,\mathrm{mg}} \cdot \frac{1000\,\mathrm{mg}}{1\,\mathrm{g}} = 1.02 \frac{\$}{\mathrm{g}}$
- Normal Aspirin: $\frac{\$11.99}{1\ pack} \cdot \frac{1\ pack}{300\ tablets} \cdot \frac{1\ tablet}{325\,\mathrm{mg}} \cdot \frac{1000\,\mathrm{mg}}{1\,\mathrm{g}} = 0.12 \frac{\$}{\mathrm{g}}$

Cost per tablet:

- Baby Aspirin: $\frac{\$2.99}{1pack} \cdot \frac{1\ pack}{36\ tablets} = \frac{\$0.08}{1\ tablet}$
- Normal Aspirin: $\frac{\$2.99}{1pack} \cdot \frac{1\ pack}{36\ tablets} = \frac{\$0.04}{1\ tablet}$

2 Performance

1. We used 4.5 ml and 16.5 ml of base to titrate the baby and normal aspirin, respectively.
   - Baby Aspirin: $4.5\,\mathrm{ml} \cdot 1\ \frac{\mathrm{g}}{\mathrm{ml}} \cdot 0.001\ \frac{\mathrm{ml}}{\mathrm{l}} \cdot 0.02\ \frac{\mathrm{mol}}{\mathrm{g}} = 0.000\,09\,\mathrm{mol}$
   - Normal Aspirin: $16.5\,\mathrm{ml} \cdot 1\ \frac{\mathrm{g}}{\mathrm{ml}} \cdot 0.001\ \frac{\mathrm{ml}}{\mathrm{l}} \cdot 0.02\ \frac{\mathrm{mol}}{\mathrm{g}} = 0.000\,33\,\mathrm{mol}$
2. Baby aspirin neutralized 0.09 mol of OH^-, while normal aspirin neutralized 0.33 mol of OH^-. (See above list for calculations)
3. The number of moles of H^+ is equal to the number of moles of OH^- required to titrate the solution. If the number of moles of H^+ were equal to the number of moles of acid, then the mass of tablets would be:
   - Baby Aspirin: $0.000\,09\,\mathrm{mol} \cdot 180.157\ \frac{\mathrm{g}}{\mathrm{mol}} = 0.0162\,\mathrm{g} = 16.2\,\mathrm{g}$
   - Normal Aspirin: $0.000\,33\,\mathrm{mol} \cdot 180.157\ \frac{\mathrm{g}}{\mathrm{mol}} = 0.0595\,\mathrm{g} = 59.5\,\mathrm{g}$
4. The actual masses of the tablets should be 81 mg and 325 mg for the baby and normal aspirins, respectively. The differences between the actual masses and the calculated masses arises from the fact that the tablet is not purely acetylsalicylic acid. There are other compounds in the tablet that contribute to its mass.

3 Conclusion

1. The baby aspirin costs 2 times as much as normal aspirin per tablet and 8.5 times as much per gram.

2. I would buy normal aspirin because it is cheaper both per tablet and per gram.

3. The biggest source of error in the lab was the fact that there were pieces of tablet that did not dissolve, possibly skewing titration results.

4. As the active ingredient of aspirin is an acid, it can cause gastrointestinal irritation and/or bleeding if it concentrates on the stomach wall, etc. However, its blood-thinning effects are useful for people who have a high risk of clotting.