NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Nano or Normal: Why do Small Things have Big Impacts?

*In this activity, you will work in a group to produce as many “bonds” as possible by collecting chemical bonds with your binding sites, your hands.*

QUESTION: Using an equal total number of people, which will collect more chemical bonds- one group, or several smaller groups?

VOCABULARY:

**Binding Site-** A region on a molecule or compound in which specific chemical bonds may form

**Chemical Bond**- an attraction between atoms

DIRECTIONS:

1. Form groups as directed by your teacher. There will be two types of groups: Normal and Nano.
   * The “Normal” Group represents average particles with larger size. In this group, you must link arms and travel around the room as a whole group. Only the two people on the end of the group may use their one free hand to collect bonds.
   * The “Nano” group represents nanoparticles with smaller size. In this group, you may move independently of your other members, collecting as many bonds as possible with both hands. At the end of the collection period, you will gather with your whole Nano Group to count total bonds.
2. In each group, count and record the total number of available binding sites (or free hands.) Remember that in that Normal group, only the end members may use their one unlinked hand.
3. All groups will have 30 seconds to move throughout the room collecting chemical bonds. Each collector may only pick up one bond at a time and must hold all bonds in their hands for the entirety of the collection period.
4. At the end of 30 seconds, count and record the total bonds collected within your group in the table below. Share your data and compare with the other groups in the class.

DATA:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Type of Group**  **(Normal or Nano)** | **# of Binding Sites (Free Hands)** | **# Bonds Collected** |
| **Group 1** |  |  |  |
| **Group 2** |  |  |  |
| **Group 3** |  |  |  |
| **Group 4** |  |  |  |

ANALYSIS:

1. What group type were you in- Normal or Nano?
2. Describe the 30 second collection period- what did you notice in your group? What did you notice about the other groups?
3. Compare the number of bonds collected in your group versus the other groups? What trend do you notice?

TAKE HOME POINT:

Using *evidence* from your work above, construct a *claim* that addresses the question, which will more effectively cause chemical bonds to occur, larger particles, or many, smaller particles?