Student Worksheet

The Surface Area-to-Volume Ratio of Nanoparticles: Part II

Materials

- 8.5 inch × 11 inch sheet of waxed paper
- modeling clay, the size of a walnut
- metric ruler
- calipers, with metric markings
- pencil
- calculator

January 16, 2008

Dear Team:
Thank you for your recommendation on what shape might work best for our nanoparticle catalyst. Trouble is, the nickel isn't reacting as much as we would like.

Please design a prototype for a new shape of particle that would get the greatest surface area-to-volume ratio. Show us, through calculations, why your shape is better than the ones we gave you.

Just so you know, you are in competition with other teams working on the same project. The best design will get a percentage from our profits!

Sincerely,

John Turner, CEO
Hydrogen Fuel, Inc.

Question Which shape would be the most reactive?

Make a Prediction _____

_____

_____

_____

_____

Procedure

NNIN Document: NNIN-1110
Rev: 12/07

1. Using the same clay as you used in Part I of this lab, design a new shape with the clay that would be even more reactive than your recommendation in Part I.

Record Your Observations

2. Draw your shape on the back of this page.
3. Label all parts of your drawing.
4. Measure any factors (radius, height, width, etc.) that would contribute to surface area. Make your own data table on the back of this page. Record your measurements there.

Shape	Diameter (cm)	Length (cm)	Width (cm)	Height (cm)

Analyze the Results

5. Calculate the surface area of your shape.
6. Calculate the volume of your shape.
7. Calculate the surface area-to-volume ratio of your shape .
8. Be sure to show all of the formulas you used and the calculations you made.

Shape	Surface area (cm^2)	Volume (cm^3)	Ratio $\frac{\text{Surface Area}}{\text{Volume}}$

Draw Conclusions

9. Explain why your shape is more reactive than the shapes in Part I.