

Collecting / Preserving Evidence

Chapter 2



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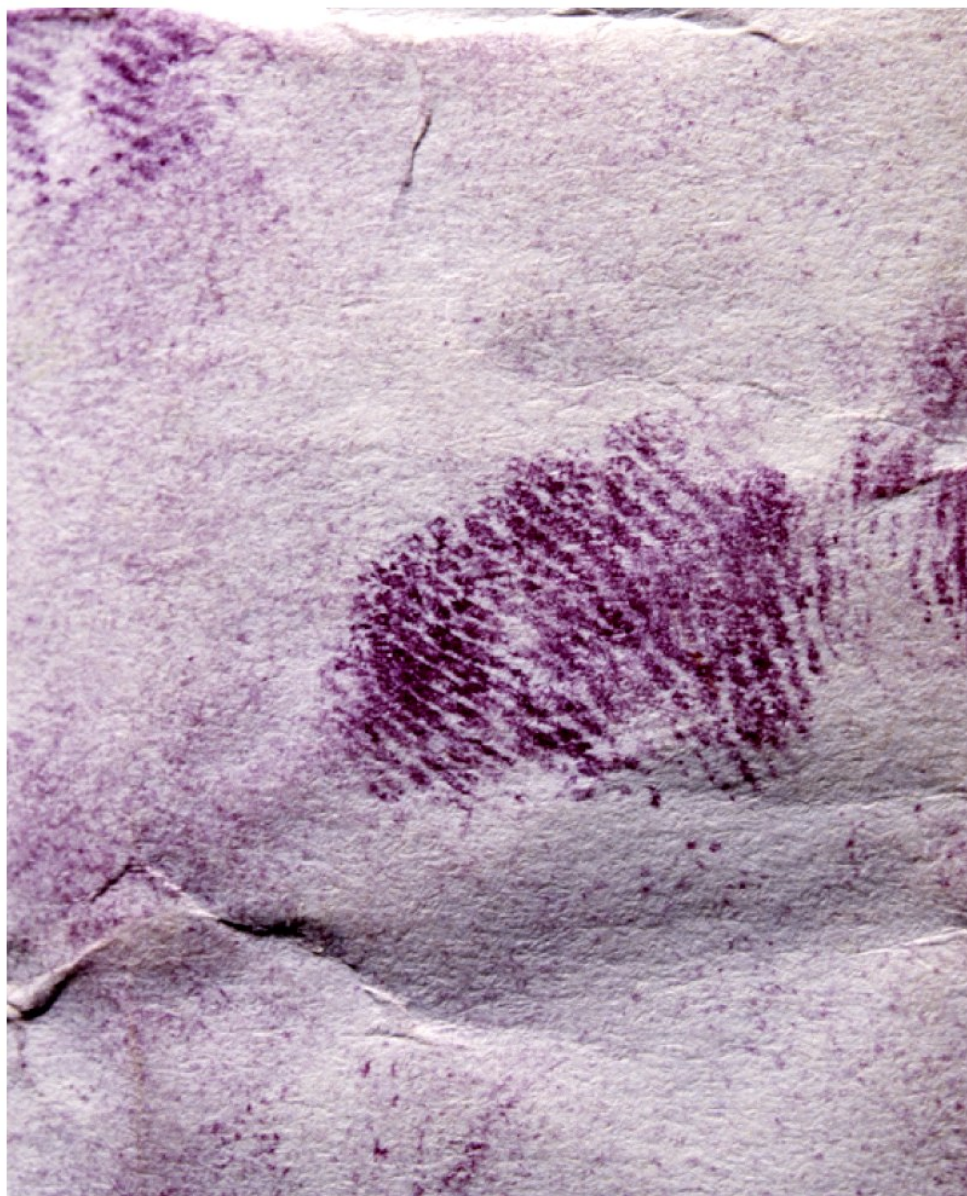
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Chemical Changes



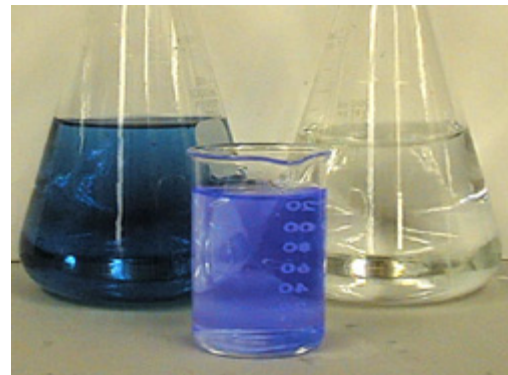
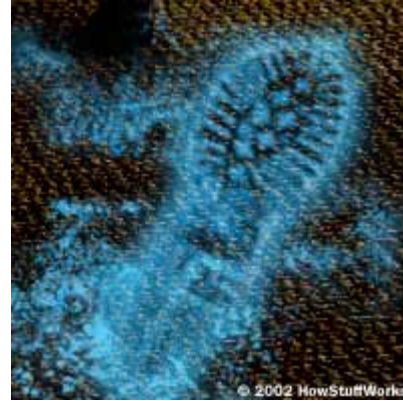
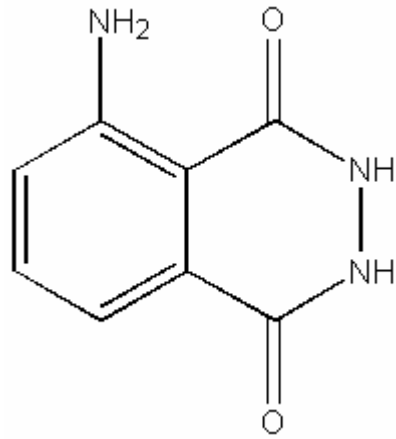
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Fingerprinting



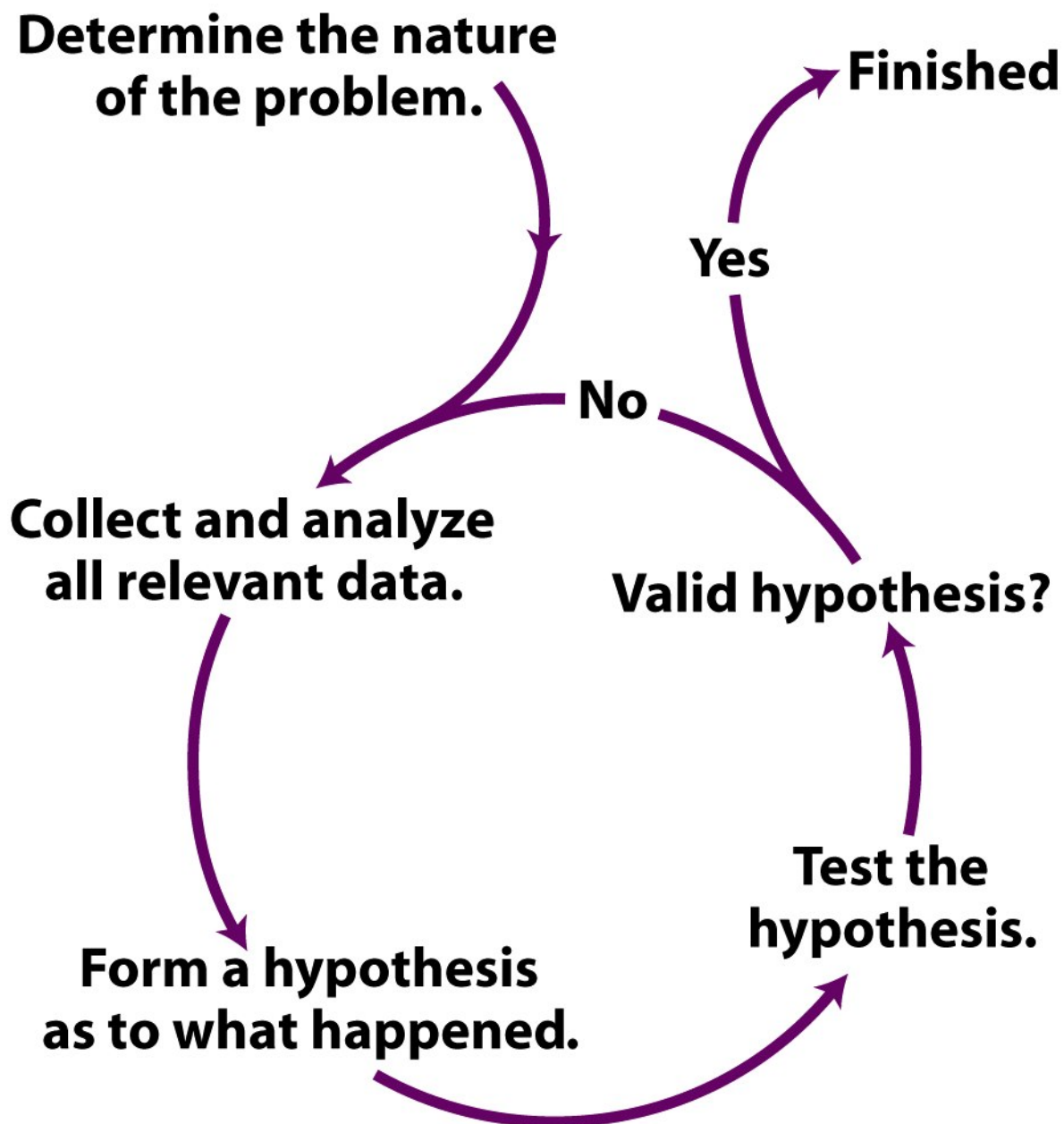
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Luminol



Physical Changes





Assignment: Scientific Method

Find and read about the steps of the scientific method

Watch video clip closely

Analyze the scene for

(1) Ways that Scientific Method is used

(2) Ways that Scientific Method is not used

(3) Based on (1) and (2), is the conclusion arrived at accurate?

Turn assignment in...

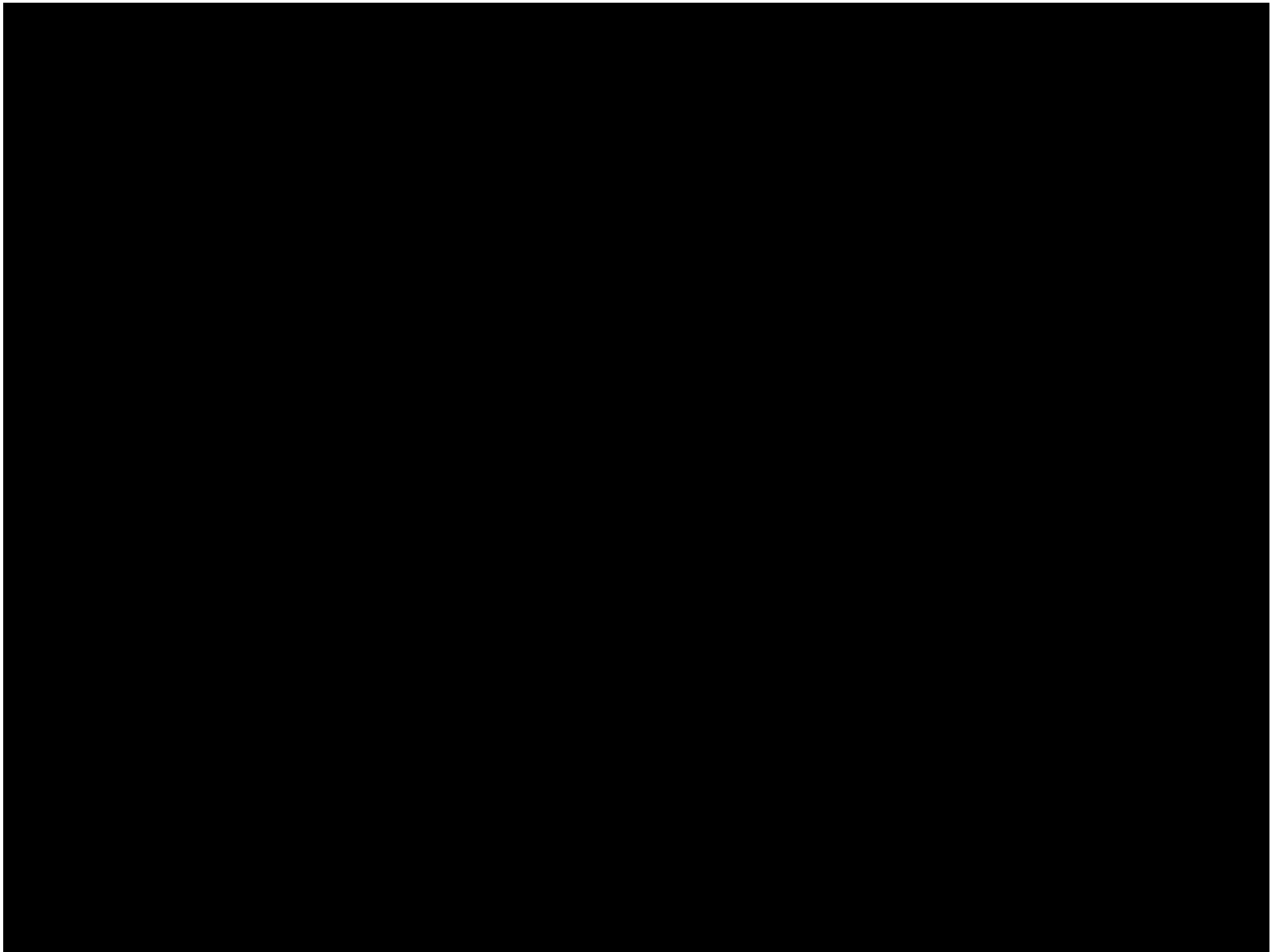


Table 2.1 Units of Measurement

Measurement Abbreviation	Units	
Mass	grams	g
Volume	liters	L
Distance	meters	m
Time	seconds	s

The standard units are used to measure experimental variables to facilitate communication between scientists.

Table 2.2 Common Prefix Modifiers

Prefix	Abbreviation	Multiplier
mega	M	1,000,000
kilo	k	1,000
deci	d	0.1
centi	c	0.01
milli	m	0.001
micro	μ	0.000001

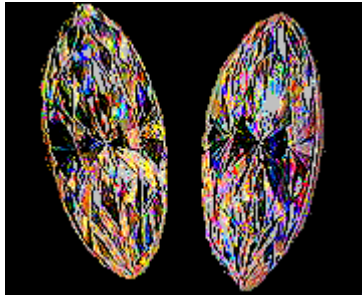
Prefix modifiers are added to units in order to convey large or small quantities in a clear and concise manner.

Table 2.3 Physical Properties of Glass

Type	Softening Point ¹ (°C)	Density (g/mL)	Refractive Index ²
Alkali barium	646	2.64	1.511
Alkali barium (optical)	647	2.60	1.512
Alkali barium borosilicate	712	2.27	1.484
Alkali borosilicate	718	2.29	1.486
Alkali strontium	688	2.26	1.519
Alkali zinc borosilicate	720	2.57	1.523
Borosilicate	720	2.28	1.490
Baria alumina borosilicate	844	2.76	1.530
Barium-alumina borosilicate	847	2.96	1.545
Borosilicate	821	2.23	1.473
Lanthanum barium	759	3.98	1.678
Lead borosilicate	447	5.46	1.860
Lead zinc borosilicate	370	3.80	—
Lithia potash borosilicate	—	2.13	1.469
Potash borosilicate	820	2.16	1.465
Potash soda lead	630	3.05	1.560
96% Silica	1530	2.18	1.458
96% Silica (porous)	1530	1.50	—
Silica (99.9% fused)	1585	2.20	1.459
Soda borosilicate	808	2.27	1.476
Soda alumina borosilicate	705	2.17	1.468
Soda-lime	696	2.47	1.510

¹The softening point is the temperature at which heated glass starts to deform under its own weight.

²The refractive index of all samples is measured at a wavelength of 589.3 nm.



Alkali strontium
borosilicate

Soda borosilicate



Alkali barium borosilicate



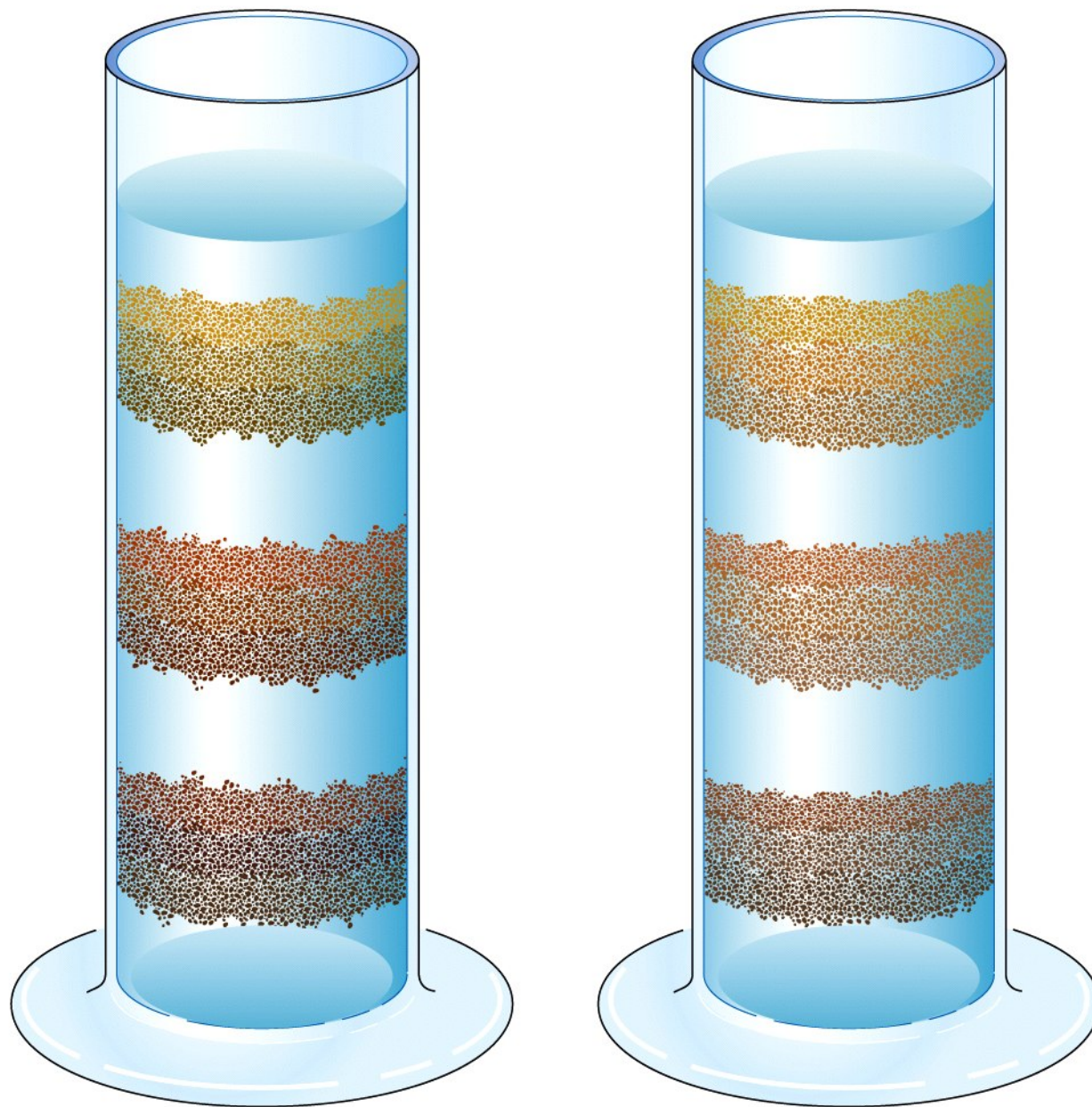


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Granulation



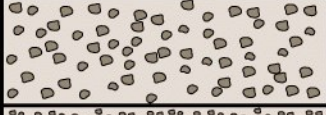

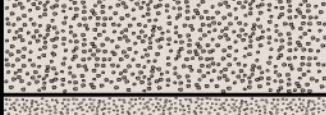
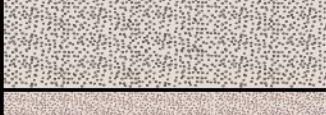

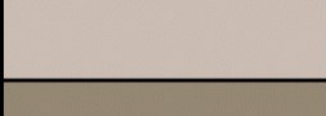



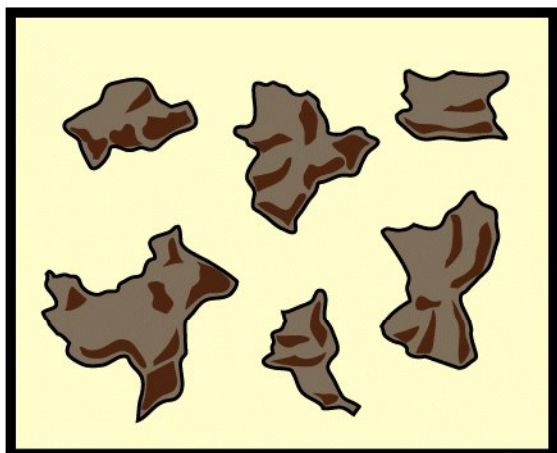
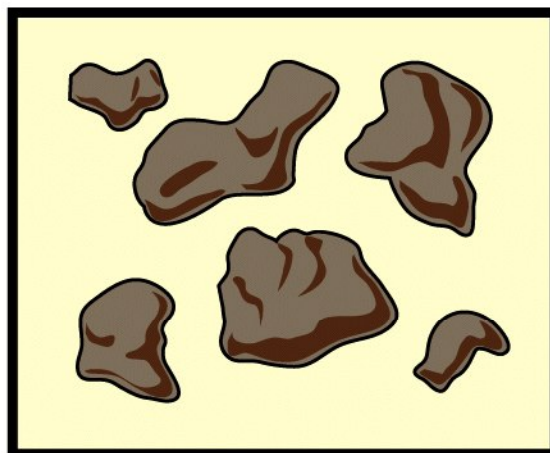
Boulders: Greater than 256 mm	
Cobbles: 64–256 mm	
Pebbles: 4–64 mm	
Granules: 2–4 mm	
Very coarse sand: 1–2 mm	
Coarse sand: 0.5–1 mm	
Medium sand: 0.25–0.5 mm	
Fine sand: 0.1–0.25 mm	
Very fine sand: 0.05–0.1 mm	
Silt: 0.002–0.05 mm	
Clay: Less than 0.002 mm	

Figure 2-4a
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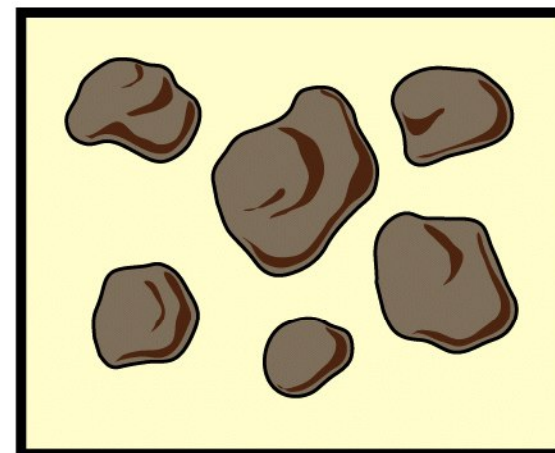
Rounding



Angular



**Semi-
rounded**



Rounded



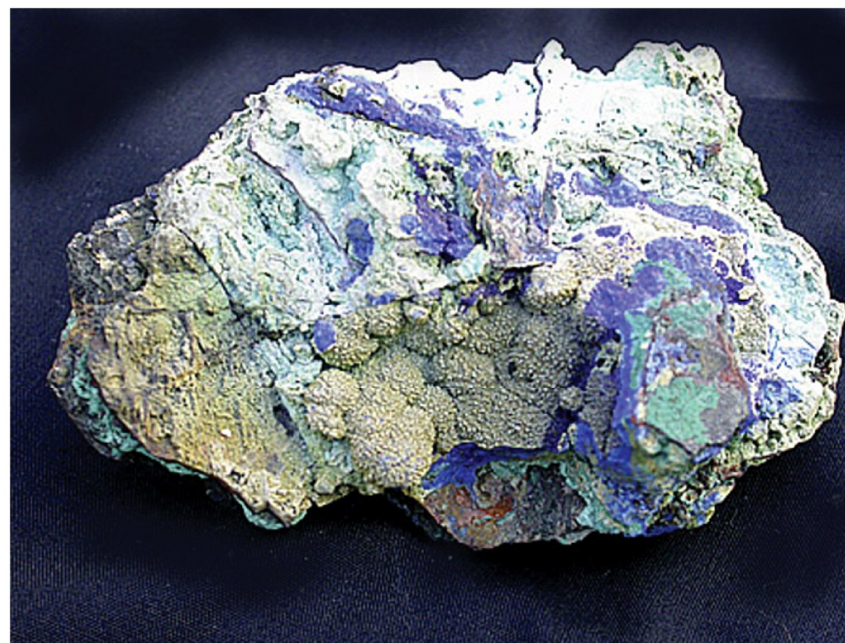
**Silicon dioxide,
 SiO_2 (quartz)**

Figure 2-5a
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**Calcium carbonate,
 CaCO_3 (calcite)**

Figure 2-5b
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Aluminum hydroxide, $\text{Al}(\text{OH})_3$ (gibbsite)

Figure 2-5c
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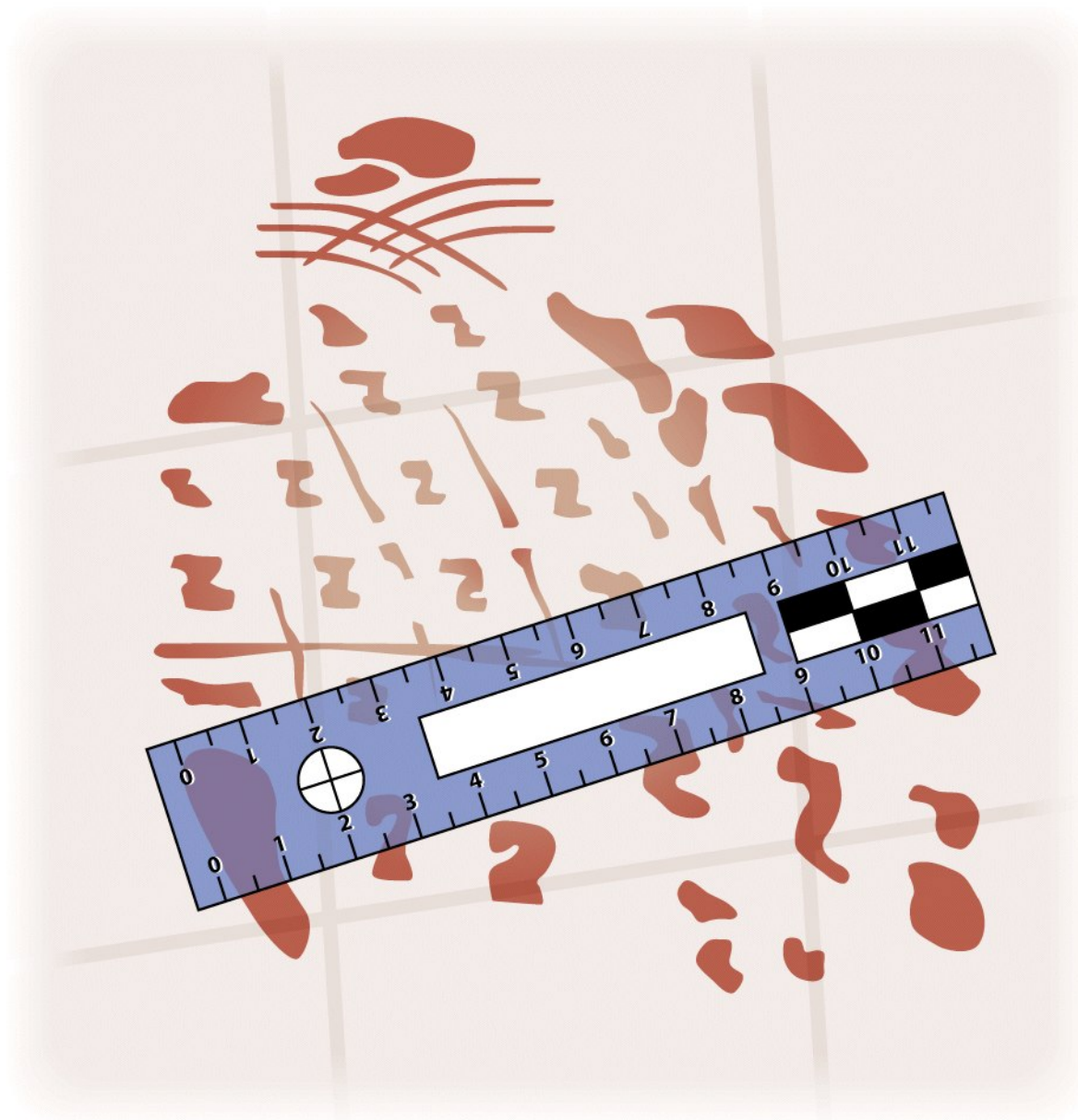
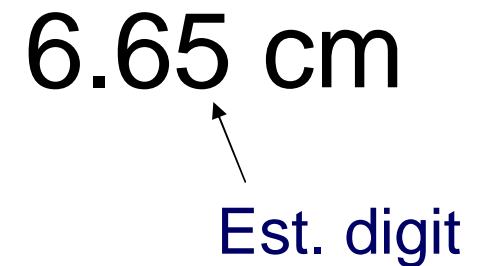
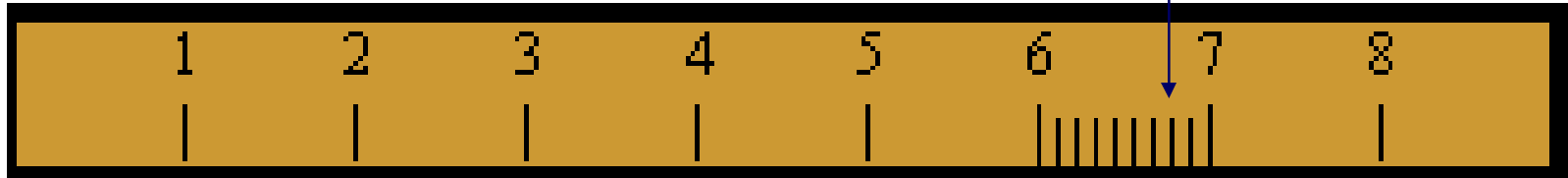
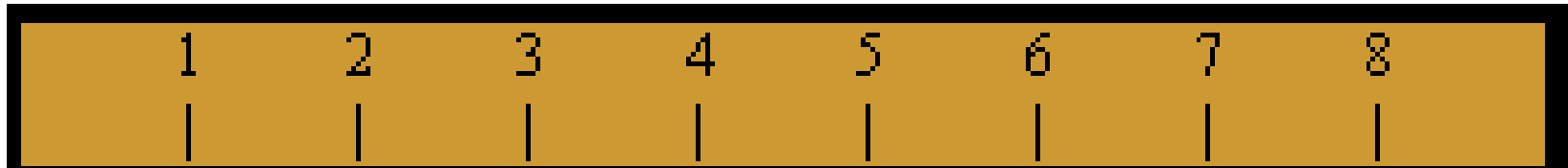


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Measurement and Accuracy





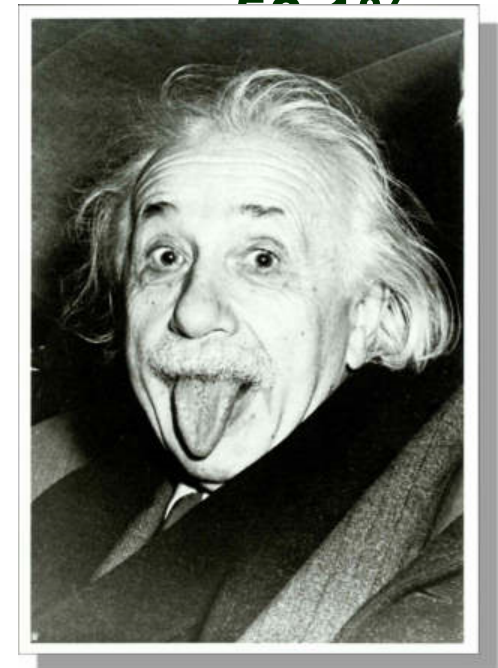
How pure is the cocaine??



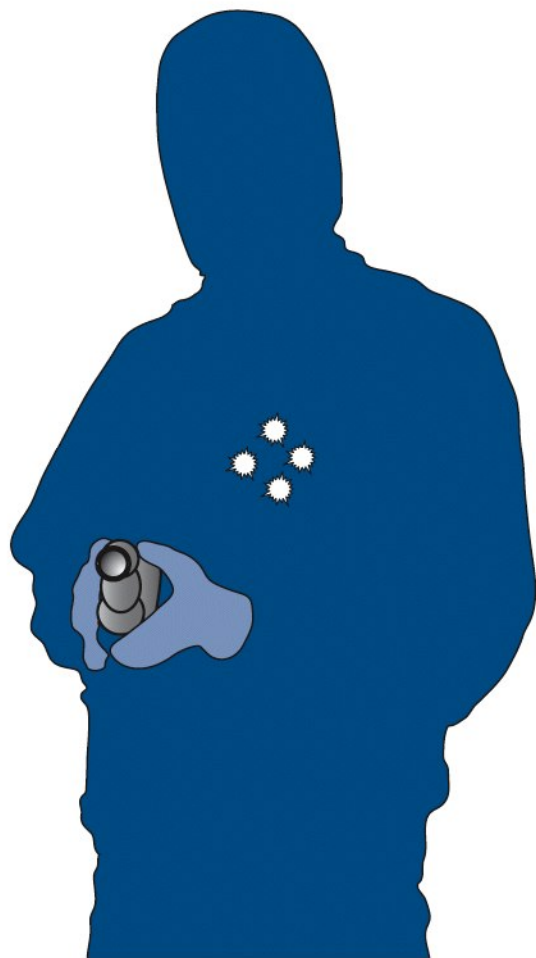
40.2%
53.6%
45.3%



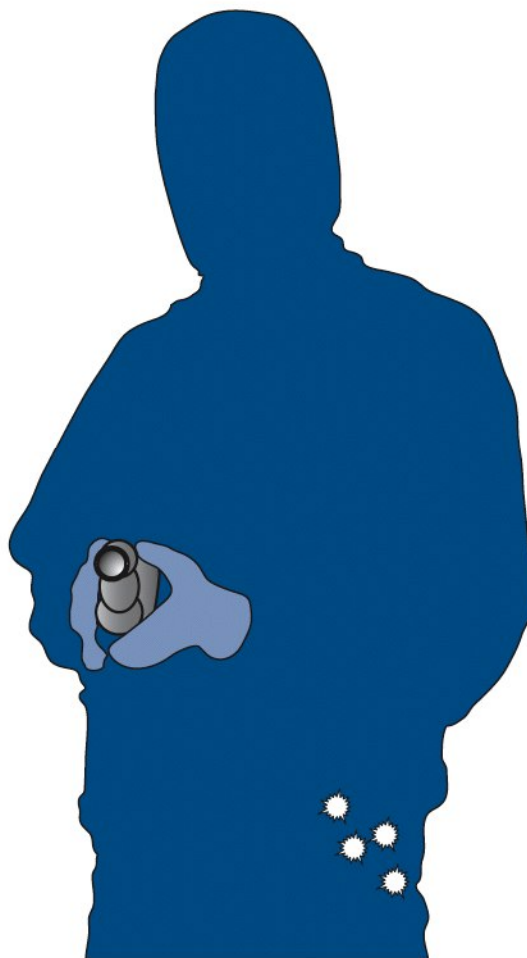
45.0%
44.9%
45.2%



**Good accuracy
Good precision**



**Poor accuracy
Good precision**



**Poor accuracy
Poor precision**

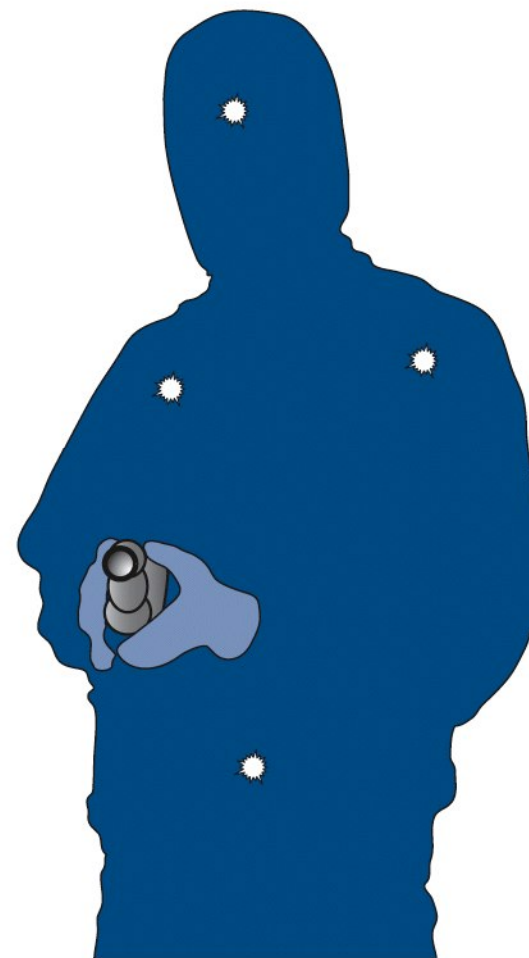


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