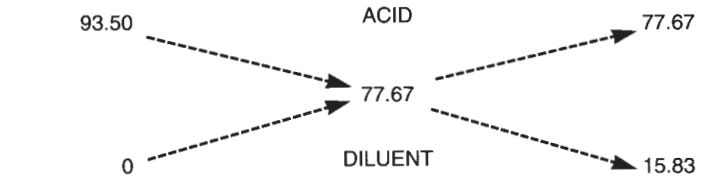
1 Dilution: Rectangle Method & Typical Dilutions

IMPORTANT:
When diluting sulfuric acid with water or when blending acids of different strengths, ALWAYS ADD THE ACID TO THE WATER or THE STRONGER ACID TO THE WEAKER ACID.
When diluting sulfuric acid, a great deal of heat may be released. Ensure materials of construction used in diluting and in storing acid are resistant to the conditions of use. Steel is not resistant to many concentrations of sulfuric acid.

The RECTANGLE METHOD provides a quick and accurate method of determining amounts of acid and diluents required for dilution or blending of sulfuric acid.
EXAMPLE To determine how many pounds of water it takes to dilute 93.50% sulfuric acid to 100 pounds of 77.67% acid.

The rectangle is drawn by placing the desired strength in the center, and the strengths of each original solution on the left hand side. By subtracting the smaller numbers from the larger numbers along the diagonals, the answers appear on the right-hand side as shown below.

(93.50% = acid 0% = water 77.67% = desired strength)



Therefore:
77.67 pounds (upper right) of 93.50%
plus
15.83 pounds (lower right) of water 0%
required to produce
93.50 pounds (upper left) of 77.67%

Since it was desired to find the quantities of 93.50% acid and water necessary to produce 100 pounds of 77.67% acid, the above quantities must be multiplied by 100 ÷ 93.50 = 1.0695

Therefore:
77.67 X 1.0695 = 83.07 POUNDS OF 93.50% ACID
plus
15.83 X 1.0695 = 16.93 POUNDS OF WATER
will produce
100.00 POUNDS OF 77.67% ACID

If you wish to convert to parts by volume, divide the pounds by the specific gravities of the respective liquids.

Typical dilutions, H_2SO_4 with water both at 80°F

Initial strength	Final strength		Specific gravity (60°/60°F)	Final temperature (°F)	Heat to be removed in cooling (Btu per lb diluted acid)		
					Final temperature		
	Degrees Baumé	Percent			80°F	110°F	140°F
66° Bé (93.19%)	60°	77.67	1.7059	244	79.1	64.5	51.8
	55°	69.65	1.6111	266	94.0	80.0	65.4
	50°	62.18	1.5263	268	101.3	85.3	70.0
	45°	55.07	1.4500	255	101.5	84.3	67.7
	40°	48.10	1.3810	234	97.9	81.0	61.2
	35°	41.27	1.3182	213	90.5	70.5	49.5
	30°	34.63	1.2609	190	81.2	59.2	37.5
98%							
	66°	93.19	1.8354	180	40	28.5	19.0
	60°	77.67	1.7059	310	112.5	97.5	84.0
	55°	69.65	1.6111	322	124.5	109.2	94.5
	50°	62.18	1.5263	287 (boils)	112.5	96.4	81.5

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