

Impact of Waste Recycling on the Composition of MSW





Problem Statement

Assess the impact of waste recycling on the percentage distribution of the components found in collected residential MSW shown in Table 1 using recycled waste composition data presented in Table 2. If 11% of the waste generated is recycled what is the composition of the generated waste?

It is recommended that you use an electronic spread sheet for this problem.





Table 1. Composition of Collected Waste

Component	As Collected, % by Weight
Food	8
Paper	28
Cardboard	8
Plasticss	9
Textiles	1
Rubber	0.8
Leather	0.8
Yard Wastes	22
Wood	3
Glass	8
Ferrous Metal	11.4



Table 2. Composition of Recycled Waste

Component	Recycled, % by Weight
Food	0
Paper	50
Cardboard	10
Plastic	6
Textiles	0
Rubber	0
Leather	0
Yard Wastes	8
Wood	0
Glass	18
Ferrous Metal	8
Total	100



Step 1: Calculate the lb of recycled waste

- Assume a basis of 100 lb of generated waste
- Recall that:
$$\text{Collected} + \text{Recycled} = \text{Generated}$$
- 11 lb out of 100 lb generated are recycled
- Table 2 provides composition of recycled waste
- Example: lb of paper recycled:
$$11 \times 0.5 = 5.5 \text{ lb recycled}/100 \text{ lb generated}$$





Table 3. Recycled MSW

Component	Recycled, % by Weight	lb recycled/100 lb Generated
Food	0	
Paper	50	5.5
Cardboard	10	
Plastic	6	
Textiles	0	
Rubber	0	
Leather	0	
Yard Wastes	8	
Wood	0	
Glass	18	
Ferrous Metal	8	
Total	100	



Table 3. Recycled MSW

Component	Recycled, % by Weight	lb recycled/100 lb Generate
Food	0	0
Paper	50	5.5
Cardboard	10	1.1
Plastic	6	0.66
Textiles	0	0
Rubber	0	0
Leather	0	0
Yard Wastes	8	0.88
Wood	0	0
Glass	18	1.98
Ferrous Metal	8	0.88
Total	100	11



Step 2. Calculate lb Collected

- If 11 lb/100 lb Generated are recycled, 89 lb are collected
- Calculate weight distribution in collected waste, totaling 89 lb
- Example: paper

$$89 \times 0.28 =$$



Table 4. Collected MSW

Component	Collected, % by weight	lb collected/100 lb Generated
Food	8	7.12
Paper	28	
Cardboard	8	
Plastic	9	
Textiles	1	
Rubber	0.8	
Leather	0.8	
Yard Wastes	22	
Wood	3	
Glass	8	
Ferrous Metal	11.4	
Total	100	89



Table 4. Collected MSW

Component	Collected, % by weight	lb collected/100 lb Generated
Food	8	7.12
Paper	28	24.92
Cardboard	8	7.12
Plastic	9	8.01
Textiles	1	0.89
Rubber	0.8	0.712
Leather	0.8	0.712
Yard Wastes	22	19.58
Wood	3	2.67
Glass	8	7.12
Ferrous Metal	11.4	10.146
Total	100	89



Step 3. Calculate Composition of Generated Waste

- Add together lb collected /100lb of generated and lb recycled/100 lb generated (last column of Tables 3 and 4)



Table 5. Composition of Generated Waste

Component	Coll, % by Wt	lb coll/100 lb Gen	Recycled, % by Wt	lb rec/100 lb Gen.	Gen., % by Wt.
Food	8	7.12	0	0	7
Paper	28	24.92	50	5.5	30
Cardboard	8	7.12	10	1.1	8
Plastic	9	8.01	6	0.66	9
Textiles	1	0.89	0	0	1
Rubber	0.8	0.712	0	0	1
Leather	0.8	0.712	0	0	1
Yard Wastes	22	19.58	8	0.88	20
Wood	3	2.67	0	0	3
Glass	8	7.12	18	1.98	9
Ferrous Metal	11.4	10.146	8	0.88	11
Total	100	89	100	11	100



Class Problem

- If 22% of the waste generated is recycled what is the composition of the generated waste in this example?



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Last updated July 2004 by Dr. Reinhart

