2b:

X(<u>x1</u>, x2)

Z(<u>x1</u>,z1)
  x1 -> X.x1

Y(<u>y1</u>, <u>z</u>)
  z -> Z.x1
Rxy(<u>x</u>,<u>y</u>,<u>z</u>,xy1)
  x -> X.x1
  (y,z)->Y.(y1,z)

Rzz(<u>xa</u>, xb)
  xa -> Z.x1
  xb -> Z.x1

2c-b:

Recipes(<u>name</u>, instructions)

OvenRecipes(<u>name</u>, time, temperature)
  name -> Recipes.name

Components(<u>cname</u>, <u>recipe</u>)
  recipe -> Recipes.name

Ingredients(<u>name</u>, unit)

Contains(<u>comp</u>, <u>recipe</u>, <u>ingredient</u>, amount)
  ingredient -> Ingredients.name
  (comp, recipe)->Components.(cname, recipe)

ConvertsTo(<u>ifrom</u>, <u>ito</u>, factor)
  ifrom -> Ingredients.name
  ito -> Ingredients.name

Bonus, most of the example recipe encoded in this design:

Recipes
("Cinamon Buns", "Crumble the yeast...")

OvenRecipes
("Cinamon Buns", 6, 220)

Components
("Main ingredients","Cinamon Buns")
("Filling","Cinamon Buns")
("Glaze","Cinamon Buns")

Ingredients
("yeast", "g")
("sugar", "g")
("milk", "dl")
("egg", "x")
("butter", "g")

Contains
("Main ingredients","Cinamon Buns","yeast",35)
("Main ingredients","Cinamon Buns","sugar",100)
("Main ingredients","Cinamon Buns","butter",120)
...
("Filling","Cinamon Buns","butter",100)
...

ConvertsTo:
(sugar, honey, 0.75)