The effect of bromine on lycopene

Necessary materials and tools:

tomato juice, saturated bromine water, large size test tube or 100 cm^3 measuring cylinder, iron stand with walnut, flask-gripper

Description of experiment:

We pour about 20 cm3 of water and tomato juice into a large test tube, in 1:1 ratio. Let us add 2-3 cm3 of saturated bromine water to it and observe the change of colour. We can help the blending with cautious stirring.

Observation:

We can see that after the addition of bromine water in red tomato juice, green, blue and maybe yellow coloured lines appear. It's like a rainbow in the tomato juice.

Explanation:

The colour of the tomato comes from the compound C40H56, lykopene. This compound is an unsaturated hydrocarbon which contains 11 conjugated double binds in each molecule. The lykopene absorbs green light, that's why we see the substance as red. Between the lykopene and the bromine an additive reaction takes place. Because of this its structure changes and the complex light is absorbed at a different wavelength. That is why the colour also changes.