1. “**Cryobar**”. There is a trick extremely popular among bartenders, namely to freeze the liquid in a bottle, may it be either chilled carbonated water or beer, with one strike. Develop quantitative physical explanation of the phenomenon. What are the characteristics of both the liquid and the bottle for complete freezing to occur? How does the freezing depend on the alcohol concentration in carbonated water?

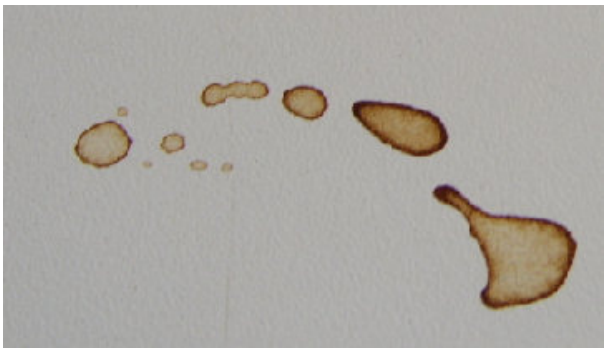
2. “**Fountain**”. When watching a vertical fountain it is possible to notice that the height of its water jet is “fluctuating”, i.e. the top of the jet is constantly changing its position. What causes this phenomenon? What characteristics of the fountain can be determined by the magnitudes of such “fluctuations”?

3. “**Kitchen Hell**”. If there is little water on a pan covered by oil then water starts to boil and “shoot” when heated. Evaluate the height at which the drops will fly depending on the temperature of the pan.

4. “**Magnetic water**”. Study the dependence between the Ph level of water and the magnetic field. Will this level be changed significantly during “magnetic storms”?

5. “ **Icy Fingers**”. Place a small tray with some water into the freezer. Under favorable combination of the size of the tray and the volume of the water there may appear a thin and long branch. Study the phenomenon. What are the sizes of the “icy fingers” determined by?

6. “**A glass, a lamp and a micro-wave oven**”. If an electric bulb is partly placed into a glass of water so that its metallic parts were under water, and place the system into a micro-wave oven then the bulb lights up. Study this phenomenon both theoretically and experimentally.



7. “**Dry spot**”. When drying a drop of coffee (tea, wine, juice etc.) leaves a spot where hard particle are mainly concentrated at the edge of the drop along its rim. Explain this phenomenon and study how irregularly the hard particles can be distributed.

8. “**Gloria**”. When in the mountains one can observe a rainbow halo around some fairly sharp contour (a man’s figure, for example). Note that the angle to observe such contour is significantly smaller than that to observe a common rainbow. What are the conditions for this phenomenon to occur? Provide its quantitative determination.

9. “**Spaghetti**”. Why will a sufficiently long macaroni rather break in several spots than in one, if curved? How does this depend on the size of macaroni?

10. “**Underwater topographer**”. Shallow mountain rivers and springs are characterized by fast and rough streams. Is it possible to figure out the bottom relief watching the flow of the upper layers of the waters? If so, what can the accuracy be and what does it depend on?

11. “ **Sherwood Forest Legend** ”. The legends about Robin Hood claim that a targeted arrow can ignite a candle. Is it possible in real life? Investigate and explain this phenomenon.

12. “**Star pilot**”. A spaceship is approaching a neutron star, but all the navigational units are broken down at a short distance to the star. Produce a technique to orientate the spaceship in the interstellar space to control the distance to the star and pave the way to it. How can this technique be modified to work near a “black hole” as well?

13. “**Nearly a lens**”. Make many regularly placed holes in a nontransparent sheet of paper. If a short-si ghted person is asked to look through such a sheet, he may seem to see better (as if through a lens). Study the phenomenon.

14. “**You cannot see anything through the fog**”. What should the characteristics of the fog and external factors be for the color of an object in the fog to “lose” its spectrum?

15. “**Snowstorm’s hair**”. When a weak wind is carrying snow along a smooth surface (for example, the ice on a river or lake), the snow flow is disrupted into thin jets. Explain this phenomenon and analyze the conditions when it occurs.

16. “**Rope and chain**”. A rope drops onto the floor. What characteristics and how exactly will the form of the rope on the floor (in particular, the number of its curves) and the distance between its beginning and end depend on? How will the outcome change in case of a chain, when there is no resistance to curving?

17. “**Honey spiral**”. A spurt of falling honey can spiral by itself. Study the phenomenon and produce its quantitative evaluation.

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