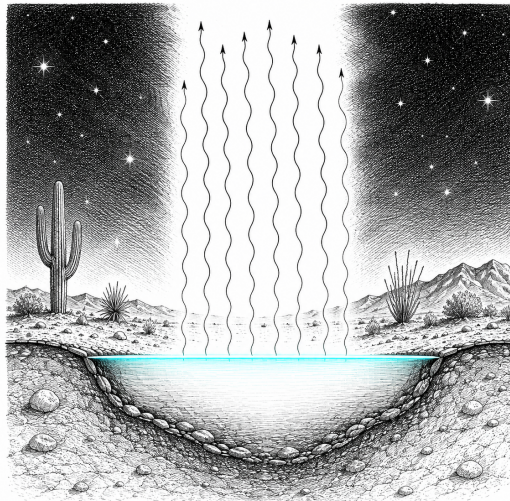


PERSIAN DESERT ICE

What it is: on the right nights, Persians pulled thin sheets of ice out of shallow pools in a hot desert with no power, no machines, and no chemicals. The trick is the clear night sky. Every warm thing glows invisible infrared heat, and on a clear, dry, calm night an open tray of water dumps that heat straight up through a window in the atmosphere, out into space, faster than the mild air can pay it back. Its surface slides below the air around it, and a thin layer freezes under air that never touched freezing. Your own backyard sits under the same sky.



The freezer is the night sky. Heat leaves the water straight up through a window in the air and keeps going, out into space.

1 THE BIG IDEA

- ▶ Everything warm glows **invisible infrared heat**. Point a surface at the open sky and some of that heat flies up through a narrow window in the air, all the way to space, and does not come back.
- ▶ On a clear dry night the sky acts like a **surface tens of degrees colder** than the air.
- ▶ The water dumps heat up faster than the calm air feeds it back, so its surface **slides below air temperature**.
- ▶ Give it a long cold night and a thin layer freezes, **even when the air never drops to 32**.

2 THE NUMBERS

- ▶ On a good clear night, radiation alone can pull **roughly 60 to 100 watts** off every square meter of surface. The old Persian pools sat near the low end.
- ▶ **Thin water wins**. Lots of sky facing surface and little depth, so it sheds its heat in one night.
- ▶ Yazd summers push **past 104 degrees**, yet its winter nights made ice out in the open.
- ▶ You have watched this happen. **Frost on the windshield** and white grass on a morning the thermometer read 37 and never hit 32.

3 WHAT YOU NEED

Wide shallow tray, matte black or unglazed terracotta **on hand**

Insulating base: dry straw, foam board, or cardboard **free**

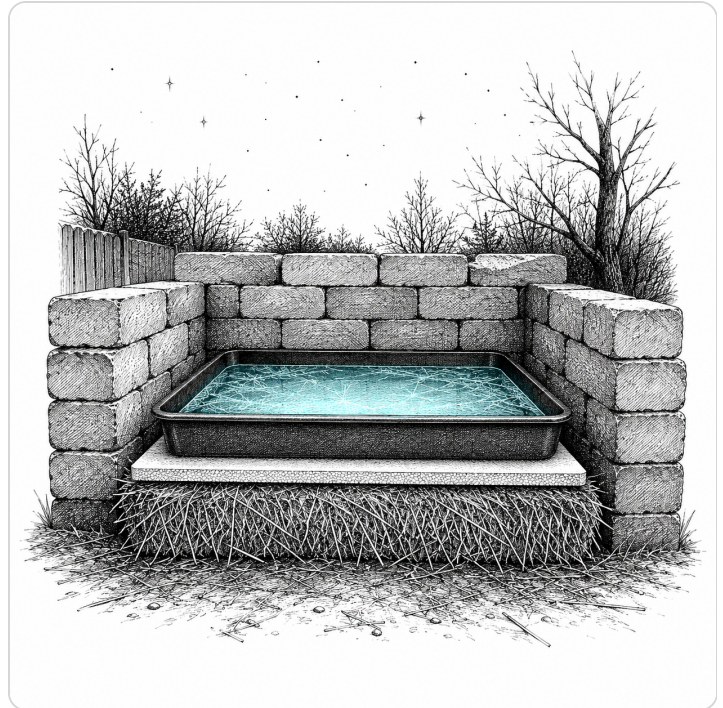
Low bricks or blocks for a windbreak wall **on hand**

Thin clear polyethylene film, optional wind shield **a few dollars**

Water, a thin layer an inch or less **free**

A tray and one clear, cold night

about free



A wide shallow tray, up on an insulating base, walled for wind, open to the whole sky.

4 BUILD IT

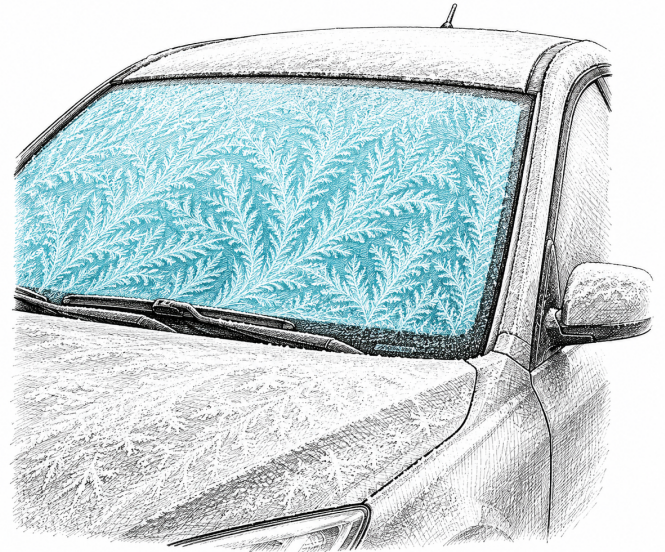
- ☐ **Wait for the right night:** clear, dry, calm, and cold, with the air near freezing or just a few degrees above.
- ☐ Pick a **wide, shallow tray**, matte black or unglazed terracotta, because a dull unglazed surface throws off infrared heat well.
- ☐ Set it on a **thick insulating base** of dry straw, foam board, or stacked cardboard, to break contact with the warmer ground.
- ☐ Put it **out in the open with a full view of the sky**. Not under a tree, not by a warm wall, not beside a parked car.
- ☐ Stack **low bricks or walls around the sides as a windbreak**. Walls, never a lid.
- ☐ If the breeze will not quit, **tent thin clear polyethylene film a couple inches above the water**. Skip glass, glass traps the heat.
- ☐ **After sunset, pour in a thin layer of water**, an inch or less.
- ☐ **Optional:** try a warm or boiled water pour, an old northern India habit. It is unproven here, so treat it as a bonus, not a rule.
- ☐ **Walk away and leave it all night**. The cooling digs deepest in the hours before dawn.
- ☐ **Harvest at first light**, before the sun touches it.
- ☐ Next clear night, **pour a fresh thin layer on yesterday's sheet** and start stacking.

5 THE PROOF IT IS REAL

- ▶ In **2014**, Stanford engineers published a paper in the journal Nature that stated **about 9 degrees colder** than the air in full midday sun, cooled by nothing but its own glow escaping the sky window.
- ▶ In **2016**, the same lab took a shielded version further. It averaged **about 67 degrees below the air** over a full day and night, and peaked **about 76 degrees below**, cold enough to freeze on radiation alone.
- ▶ Engineers at the **Indian Institute of Technology in Bombay** ran a no external power ice maker project on this exact principle.
- ▶ The everyday proof is on your car: **frost and white grass** while the porch thermometer reads 37.

 A long shallow Persian ice basin with a thin sheet of ice beside a tall mud brick shade wall, a domed ice house behind

The yakhchal dome never froze anything. The night sky made the ice. The dome just refused to give it back.



The Persian ice machine, running in your driveway. The glass radiated below freezing while the air stayed above it.

6 HOW THE PERSIANS SCALED IT

- ▶ Each winter evening they filled **long, shallow, open air basins** with a thin layer of water.
- ▶ Tall **shade walls** kept the sun off by day and blocked the wind by night.
- ▶ Each clear night they poured a fresh thin layer on the last night's ice, building slabs **up to about 20 inches thick**.
- ▶ Before sunrise they cut the slabs and hauled them into a **yakhchal**, a giant mud brick dome up to around **60 feet tall**, that held the ice through summers over 104 degrees.

7 THE GO OR NO GO CHECKLIST

All four have to line up on the same night. Miss one and you wake to cold water, not ice.

- ☐ **CLEAR SKY.** Clouds send infrared back down and can shrink the cooling enough to stop ice. Overcast is a no go.
- ☐ **DRY AIR.** Humidity works against you the same way. Muggy is a no go.
- ☐ **CALM.** Wind stirs warm air onto the tray and undoes the drop. Breezy is a no go.
- ☐ **COLD NIGHT.** Air near freezing or a few degrees above, holding all night long. Genuinely warm is a no go.

! READ BEFORE YOU EXPECT ICE

EXPECT A SHEET, NOT A BLOCK. Your rig is a plain surface, not a lab panel, so expect it to run **a few degrees below the air, maybe 10 or 15 on a perfect night**, and expect a **thin sheet of ice**, not a solid block.

A MISS IS THE CHECKLIST, NOT THE BUILD. Cloudy, muggy, breezy, or warm, and you will wake to cold water. That is the **weather failing**, not your rig. The old ice makers obeyed the same checklist.

NO LID, NO GLASS. A lid or a glass cover **traps the heat** you are trying to send to the sky. Use walls for wind, and only thin clear polyethylene film if you must cover it at all.

THE WHOLE THING, FREE

Watch the full build at youtube.com/@SketchySurvival101

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\$0
THE SKY IS THE FREEZER