

# Materials for poop bags and their environmental impacts

## Comparison of PE-based, bio-based, and cellulose-based material types

### PE virgin granulate

Components: 100% petroleum-based polyethylene

Certificates: -

Degradability: ❌ Not biodegradable

Disposal: 🔥 Residual waste (always!)

Advantages: Robust; lightweight; high heating value; clean combustion

Disadvantages: Fossil-based; high energy consumption and carbon footprint during production; microplastic formation upon environmental release; very long environmental persistence

**Conclusion: Not recommended – conventional & fossil-based**

### Oxo-degradable plastic

Components: 97-98% polyethylene, 2-3% oxo additives (e.g. metal salts)

Certificates: -

Degradability: ❌ Not biodegradable, fragmentation into microplastics

Disposal: 🔥 Residual waste (always!)

Advantages: -

Disadvantages: No biodegradation; microplastic formation upon environmental release; high energy consumption and carbon footprint during production (see disadvantages of PE); **banned from sale in the EU since 3 July 2021 (Directive EU 2019/904, Art. 5)** ❌

**Conclusion: Banned & not recommended – ecological risks**

### PE + Thermoplastic starch

Components: Mixture of fossil-based PE and bio-based starch

Certificates: -

Degradability: ❌ Not biodegradable, fragmentation into microplastics

Disposal: 🔥 Residual waste (always!)

Advantages: Partially bio-based

Disadvantages: No biological degradation; microplastic formation upon environmental release; misleading description as 'biodegradable' by some suppliers

**Conclusion: Not recommended – ecological risks**

### PIR (post-industrial recycle)

Components: Recycled polyethylene from production waste from plastics

Certificates: -

Degradability: ❌ Not biodegradable

Disposal: 🔥 Residual waste (always!)

Advantages: Significantly lower CO<sub>2</sub> emissions during production than PE virgin granulate; reduces the consumption of new raw materials; robust; lightweight; high heating value and clean combustion

Disadvantages: Microplastic formation upon environmental release; possibly slight inhomogeneities in film colour, appearance and feel

**Conclusion: Recommended – resource-efficient**

### PCR (post-consumer recycle)

Components: Recycled polyethylene from end-consumer waste, e.g. plastic packaging from household recycling collections

Certificates: e.g. Blue Angel (for ≥ 80% PCR content)

Degradability: ❌ Not biodegradable

Disposal: 🔥 Residual waste (always!)

Advantages: Significantly lower CO<sub>2</sub> emissions during production than virgin PE granulate; reduces waste & the consumption of new raw materials; promotes circular economy; high heating value and clean combustion

Disadvantages: Microplastic formation upon environmental release; possibly slight inhomogeneities in film colour, appearance and feel

**Conclusion: Recommended – most eco-friendly PE-based material**

### Bio PE

Components: Bio-based PE made from up to 100% renewable raw materials (e.g. sugar cane), chemically identical to conventional PE

Certificates: e.g. OK biobased (TÜV Austria)

Degradability: ❌ Not biodegradable, same material properties as PE

Disposal: 🔥 Residual waste (always!)

Advantages: Lower fossil content due to plant-based components

Disadvantages: No degradation possible; high energy consumption during production; land use

**Conclusion: Limited – bio-based, but not biodegradable**

### Polyvinyl alcohol (PVA)

Components: Polyvinyl alcohol (high proportion, usually ≥ 80%), mostly fossil-based

Certificates: -

Degradability: Degradation possible as it is water-soluble, but not weather-resistant

Disposal: 🔥 Residual waste (always!)

Advantages: Water-soluble; rapid biodegradation; no microplastic formation

Disadvantages: Not weather-resistant; dissolves in moisture

**Conclusion: Limited – degradable, but not practical**

### OK compost INDUSTRIAL

Components: Typically renewable raw materials (e.g. corn starch) and biodegradable copolymers (e.g. PBAT)

Certificates: OK compost INDUSTRIAL (TÜV Austria), acc. to EN 13432

Degradability: Only biodegradable in industrial composting facilities; must be converted to at least 90% CO<sub>2</sub> at 58-60 °C within 6 months

Disposal: 🔥 Residual waste (always!)

Advantages: Lower fossil content due to plant-based components; no ecotoxicity

Disadvantages: Filled dog waste bags do not end up in composting facilities; no degradation at low temperatures, as they occur in nature

**Conclusion: Limited – only degradable at high temperatures**

### OK compost HOME

Components: Typically renewable raw materials (e.g. corn starch) and biodegradable copolymers (e.g. PBAT)

Certificates: OK compost HOME (TÜV Austria)

Degradability: Biodegradable at low temperatures (tested at 20-30 °C, must be converted to at least 90% CO<sub>2</sub> within 12 months, home composting conditions)

Disposal: 🔥 Residual waste (always!)

Advantages: Degradation under realistic conditions; no microplastic formation; no ecotoxicity

Disadvantages: More expensive than PE-based materials

**Conclusion: Recommended – practically biodegradable**

### OK biodegradable SOIL

Components: Typically renewable raw materials (e.g. corn starch) and biodegradable copolymers (e.g. PBAT)

Certificates: OK biodegradable SOIL (TÜV Austria)

Degradability: Biodegradable in soil at low temperatures (tested at 20-25 °C, degradation to at least 90% in 2 years)

Disposal: 🔥 Residual waste (always!)

Advantages: Degradation under realistic conditions (dog waste bags often end up in bushes); lower fossil content due to plant-based components; no microplastic formation; no ecotoxicity

Disadvantages: Possibly slower degradation; more expensive than PE

**Conclusion: Recommended – practically biodegradable**

### Paper / cardboard

Components: Cellulose fibres (fresh fibres or recycled material), possibly starch or glue additives

Certificates: e.g. FSC®, PEFC

Degradability: Naturally degradable, but possibly slow, depending on material thickness and coating

Disposal: 🔥 Residual waste (always!)

Advantages: Plant-based; biodegradable; recycled material can be used

Disadvantages: Low tear resistance; sensitive to moisture; disproportionately high material and transport costs; up to 10 times heavier than plastic bags; unwieldy

**Conclusion: Limited – wood-based, high material consumption**

### The best choice

**OK compost HOME & OK biodegradable SOIL:**

Regarding the problem of littering, dog waste bags can fulfil an important 'airbag function' if they are biodegradable at low temperatures and at a significant rate.

**Post-consumer recycled material (PE):**

Lowest climate impact, provided the bags are always disposed of correctly (in residual waste) and as long as fossil raw materials are used for energy production. The higher the proportion of PCR, the better the environmental balance.

**Important evaluation criteria for dog waste bags:**

Biodegradability at low temperatures; resource consumption; origin of raw materials; location, energy source and working conditions of production; use of additives, printing inks and packaging materials; actual disposal behaviour and benefits of thermal recycling; suitability for mass production, quality and price; material certification; transparency and credibility of environmental communication.